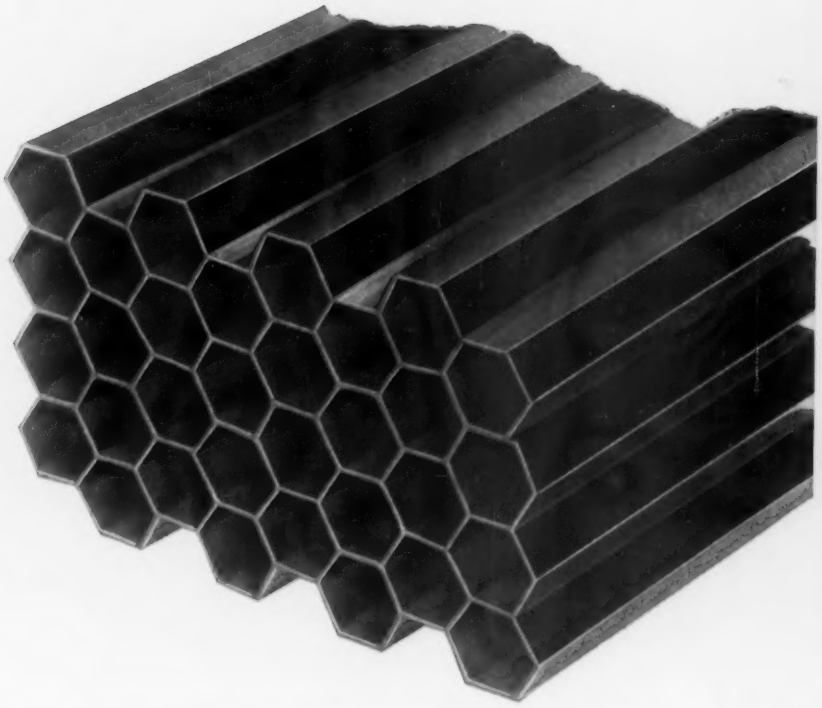
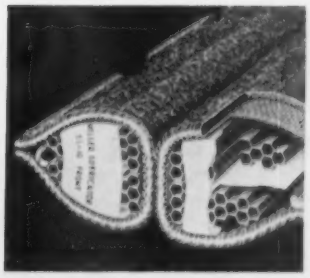
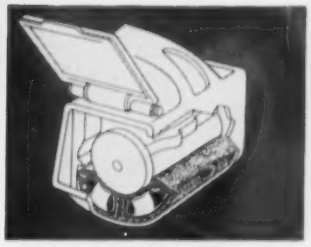
Another new development using

B.F.Goodrich Chemical *raw materials*





Lubricator for freight car journal boxes manufactured by Miller Lubricator Company, Winona, Minn. Hycar rubber is used in honeycomb spring core. Hycar latex is used as anchor for pad threads.



Cutaway drawing showing journal box application of lubricator pad that stops "hot boxes". Resilient Hycar core permits easy pad installation, assures uniform pad-journal contact and withstands oil immersion.

First honeycomb extrusion of rubber made possible by Hycar

THROUGH imaginative die engineering and the use of Hycar nitrile rubber, Miller Lubricator Company has developed a technique for producing low-cost multiple-extrusions of rubber honeycombs.

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Learn more about Hycar—it may help *you* design new products or improve the ones you already make. For information on Hycar, write Dept. HO-7, B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar

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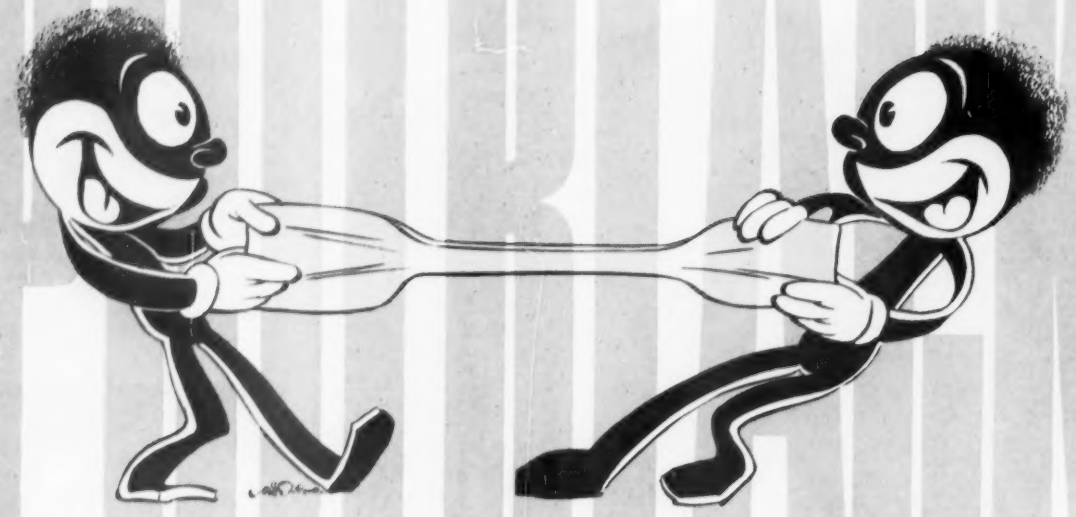

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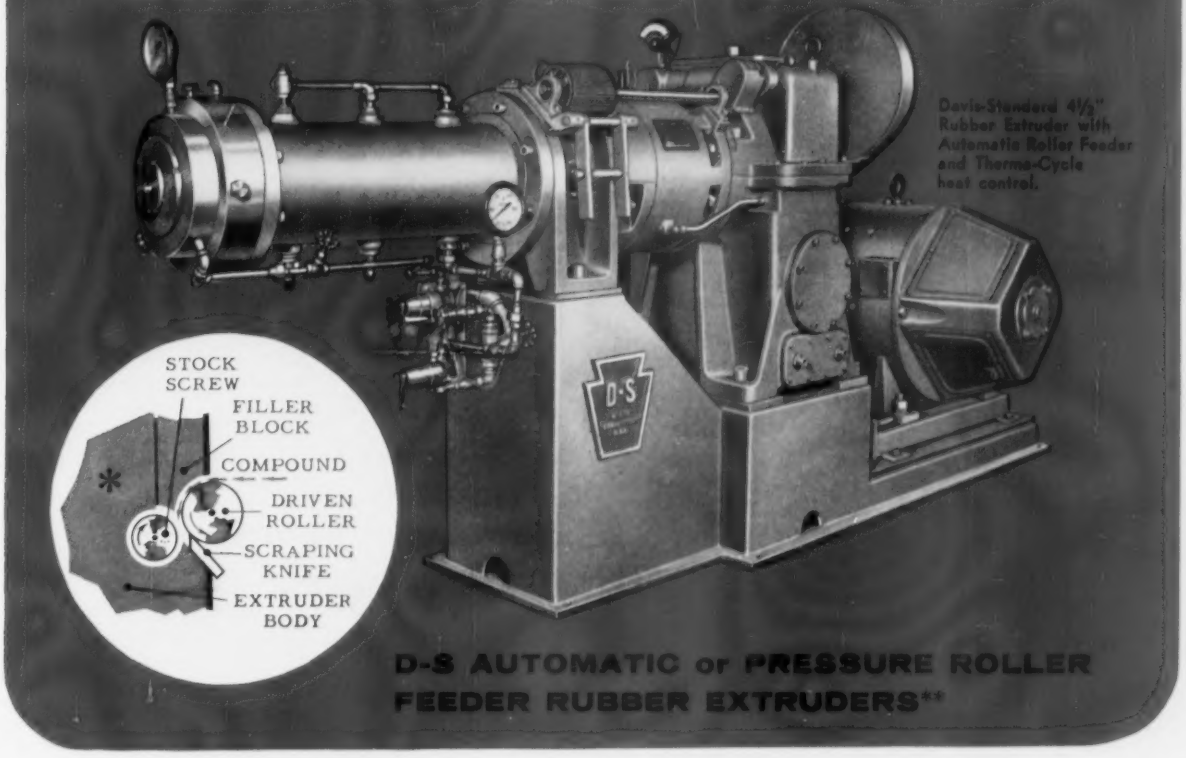

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COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

JULY, 1957 VOL. 81 NO. 4

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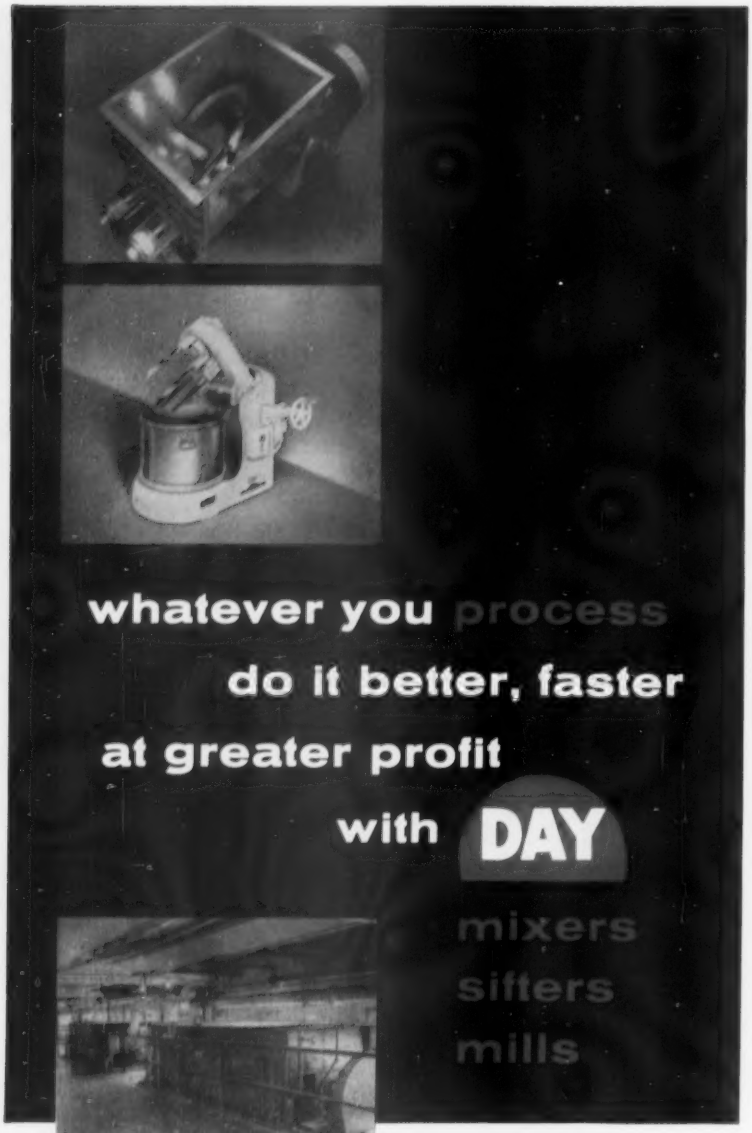

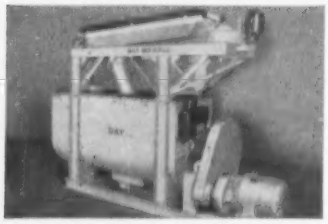

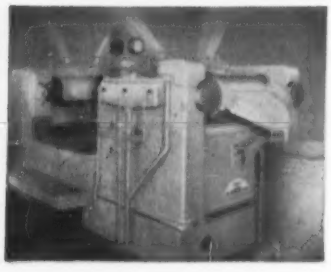

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Coming Events . . .

July 26. Chicago Rubber Group, Golf Outing, Medinah Country Club, Medinah, Ill.

Aug. 1. New York Rubber Group, Golf Outing, Baltusrol Golf Club, Springfield, N. J.

Aug. 16. Philadelphia Rubber Group, Golf Outing, Manufacturers' Country Club, Philadelphia, Penna.

Sept. 7. Connecticut Rubber Group.

Sept. 11-13. Division of Rubber Chemistry, A.C.S., Fall Meeting, Hotel Commodore, New York, N. Y.

Sept. 23-25. A.S.M.E., Fall Meeting, Hotel Statler, Hartford, Conn.

Sept. 26. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Oct. 1. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Oct. 4. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Oct. 4. New York Rubber Group, Henry Hudson Hotel, New York, N. Y.

Oct. 8. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 11. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Oct. 18. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 24. Southern Ohio Rubber Group, Fall Technical Meeting, Engineers Club, Dayton, Ohio.

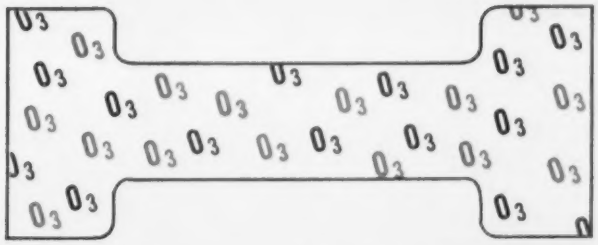
Oct. 25. Akron Rubber Group, Fall Meeting, Sheraton-Mayflower Hotel, Akron, Ohio.

Oct. 25. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Nov. 5. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 15. Chicago Rubber Group, Furniture Club, Chicago, Ill.

Nov. 15. Connecticut Rubber Group.



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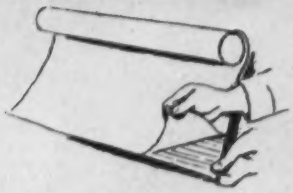

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Coming Events (cont'd) . . .

Nov. 15-16. Southern Rubber Group, Peabody Hotel, Memphis, Tenn.

Dec. 1-6. A.S.M.E. Annual Meeting, Hotel Statler, New York, N. Y.

Dec. 3. Buffalo Rubber Group, Xmas Party.

Dec. 5. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 6. Detroit Rubber & Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 10-11. Society of the Plastics Industry, Sheeting and Coated Fabrics Division Conference, Commodore Hotel, New York, N.Y.

Dec. 13. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

Dec. 13. New York Rubber Group, Latin Quarter, New York, N. Y.

Dec. 14. Southern Ohio Rubber Group, Winter Meeting, Miami Valley Golf Club, Dayton, Ohio.

Dec. 20. Chicago Rubber Group, Xmas Party, Morrison Hotel, Chicago, Ill.

Jan. 24, 1958. Akron Rubber Group, Sheraton-Mayflower Hotel, Akron, Ohio.

Feb. 13, 1958. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Feb. 21-22, 1958. Southern Rubber Group, Houston, Texas.

April 10, 1958. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

April 11, 1958. Akron Rubber Group, Spring Meeting, Sheraton-Mayflower Hotel, Akron, Ohio.

May 14-16, 1958. Division of Rubber Chemistry, A.C.S., Spring Meeting, Netherlands Plaza Hotel, Cincinnati, Ohio.

June 20, 1958. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 22-28, 1958. A.S.T.M. Annual Meeting, Hotel Statler, Boston Mass.

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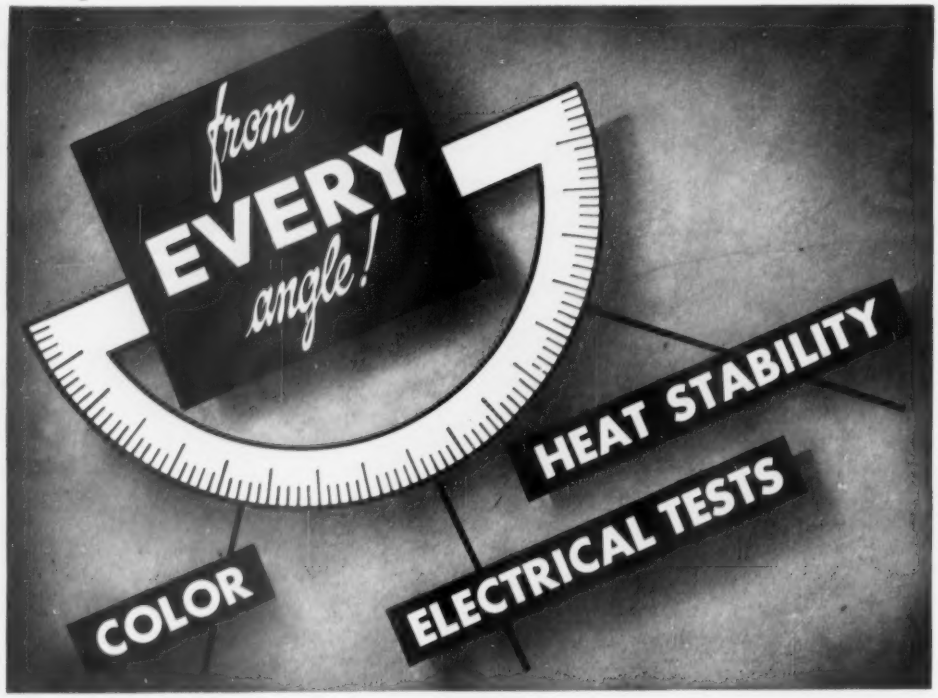

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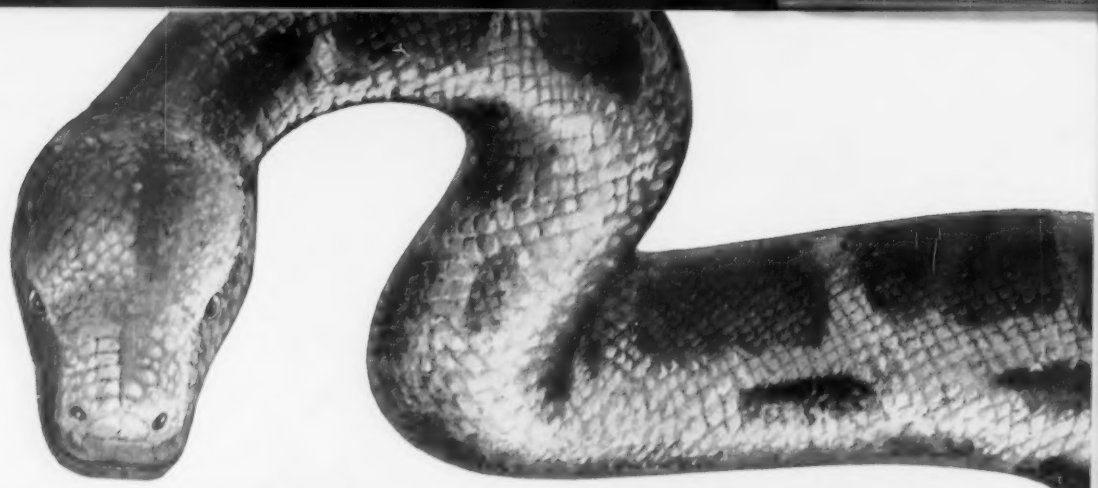

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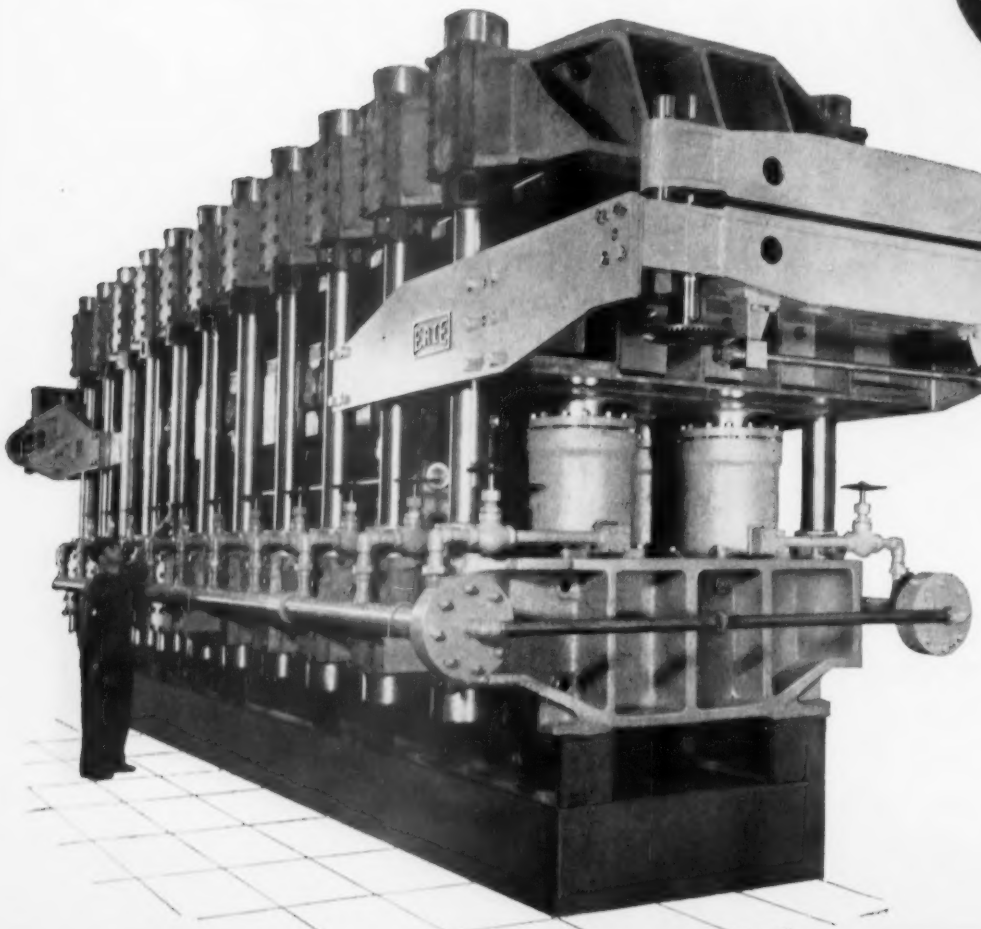

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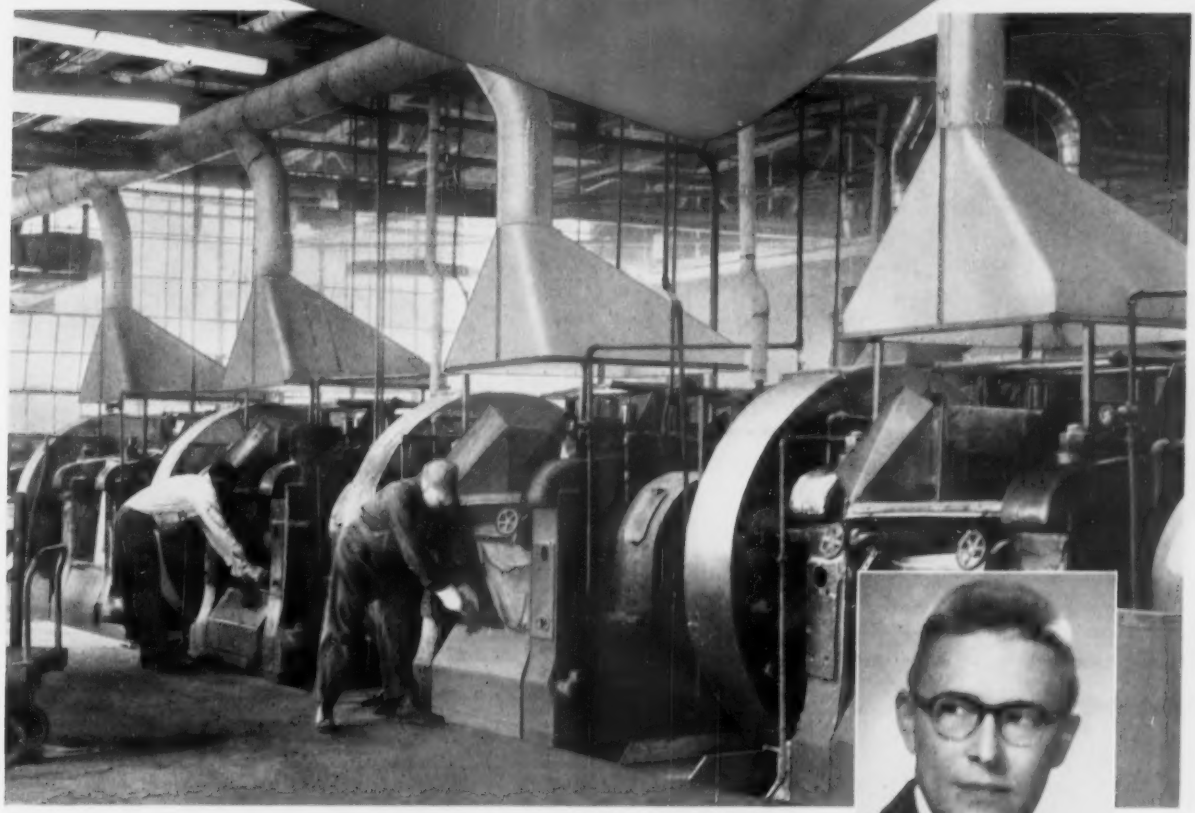

Wayne F. Nelson heads the research and technical staff of A. Schulman, Inc. and will work with you in meeting specifications with re-processed GRS plant cleanup.

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Wayne F. Nelson, director of research at A. Schulman, Inc., suggests: "Where application of re-processed GRS plant cleanup can be utilized in conjunction with new rubber, we recommend our S-100 GRS, which is laboratory controlled, and can be supplied at considerable saving in cost.

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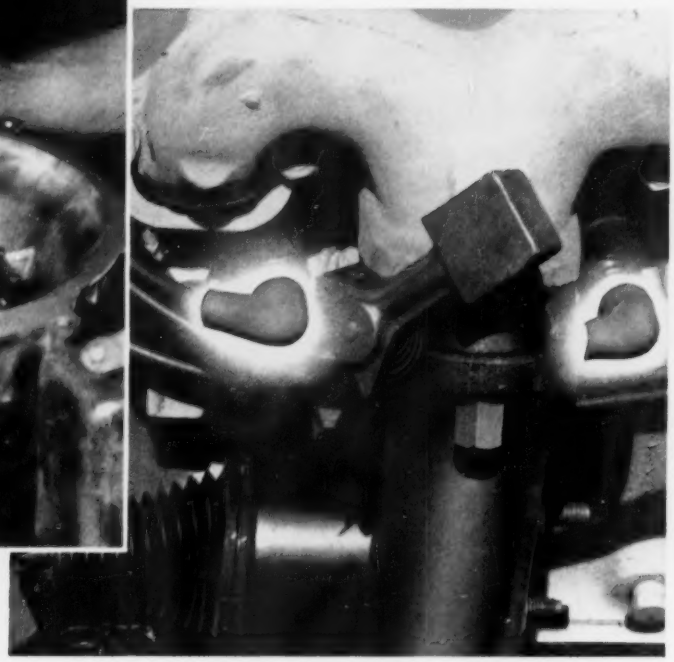

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SILASTIC 432 Base

speeds processing of stocks for molded parts

TYPICAL PROPERTIES OF
MOLDED PARTS
MADE WITH SILASTIC 432 BASE

Temperature range, F.	−100 to +500
Tensile strength, psi	800
Elongation, %	260
Tear strength, ppi	70
Compression set, %	25
Hardness, Durometer	50

All properties obtained on ASTM slabs molded 5 minutes at 260 F and cured 8 hours at 480 F.

You can compound stocks with *superior physical properties* easier and faster with Silastic* 432 Base than with any silicone rubber gum. This unique Dow Corning compounding base needs no toxic additives for low compression set, requires no bin aging after compounding and has excellent shelf life. Most important, parts molded from stocks compounded with 432 Base show remarkable resistance to heat, cold, moisture and certain hot oils.

Do you want the recipe? *Complete instructions on the compounding of stocks for better molded parts using Silastic 432 Base plus other custom formulations are obtainable at any Dow Corning branch office. Just ask . . . no obligation.*

FREE SAMPLE *Try Silastic 432 Base in your own plant. Write Today. Address Dept. 9219*

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MIDLAND, MICHIGAN

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for top
performance...

witco-
continental
CARBON
BLACKS

There's a lot of "breeding" in the carbon blacks listed below—the result of 37 years' experience in serving the rubber industry by improving our manufacturing techniques to upgrade specifications. Always, the objective is to provide Witco-Continental Carbon Blacks consistent in quality, and meeting your range of compounding requirements. *Write for technical information and samples.*

Witco-Continental CARBON BLACKS

Furnace Blacks
Continex® SRF—Semi-Reinforcing
Continex SRF-NS—Non-Staining
Continex HMF—High Modulus
Continex HAF—High Abrasion
Continex FEF—Fast Extruding
Continex ISAF—Intermediate Super Abrasion
Continex CF—Conductive Furnace

Channel Blacks
Continental® AA—(EPC)—Witco No. 12
Continental A—(MPC)—Witco No. 1
Continental F—(HPC)—Witco No. 6
Continental R-40—(CC)—Conducting

37 Years of Growth

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WITCO CHEMICAL COMPANY
CONTINENTAL CARBON COMPANY
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Chicago • Boston • Akron • Atlanta • Houston • Los Angeles • San Francisco • London and Manchester, England

In these five Standard Units are all the necessary components to control effectively the degradation mechanisms that take place in polyvinyl chloride resins on aging, during heat processing or on exposure to sunlight. They are widely used alone and in combinations for specific effects in clear and opaque stocks. Their advantages have been proven over other tested materials, such as those based on tin (which frequently decolorizes effects of degradation without correcting them) or on lead (which frequently contributes to oxidation and breakdown on aging). We also supply combinations of components selected from these five Standard Units, to correct special conditions encountered in each Vinyl Processing Industry.

Write for information about stabilizers designed for versatile and inexpensive use in formulations employed in your particular vinyl processing industry.

Is it for—

Quality Vinyl Flooring?
Non-Plating Calendered Stocks?
Maximum Clear Sheets?
Non-Sulfur Staining Films?
Low Cost Clear & Opaque Hose?
Top Physical Properties in Rigids?
Air-Releasing Plastisols?
Controlled Slush Molding?

This Stabilizer System is for

CLEAR SHEETS
Cd 2-V-4
Org 8-V-1

The HARSHAW CHEMICAL Co.

1945 E. 97th STREET • CLEVELAND 6, OHIO

Key to not changing hoses in midstream

The nation's need for oil grows daily. And with it grows the importance of rubber hose as a link between well and market.

It used to be that the vital stream of petroleum products frequently was interrupted by premature hose failures. Complaints were commonplace, users changed brands often and hose manufacturers could do little to improve the situation.

The picture changed, however, with the introduction of CHEMIGUM – first of the nitrile rubbers–back in 1940. Through the years, the outstanding resistance of CHEMIGUM has helped immeasurably to reduce the flow of complaints on hose failures to a mere trickle. And each year has seen a steady improvement in the quality and processability of this unusual rubber.

To handle oil, solvents and chemicals, CHEMIGUM is also used by rubber manufacturers in pump linings, diaphragms, seals, packings, O-rings, hard-rubber pipe and fittings, as well as in hose and mechanical goods. As either a manufacturer or purchaser of rubber products, you stand to benefit from an appraisal of CHEMIGUM and what it can do for you. Whatever your interest in rubber products, you will find our latest manual informative and helpful. Write for "A New Look at Nitrile Rubber," to:

Goodyear, Chemical Division, Dept. G-9419, Akron 16, Ohio.

CHEMICAL
GOODYEAR
DIVISION

RUBBER & RUBBER CHEMICALS DEPARTMENT

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic – T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS
High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

What's first and foremost for foam?

First and foremost choice of a number of manufacturers of foamed rubber products is one of two Goodyear latices—PLIOLITE LATEX 2104 or PLIOLITE LATEX 2105.

PLIOLITE LATEX 2104 is a "cold" polybutadiene latex which exhibits virtually no odor. This feature plus its high solids content and excellent mechanical stability make PLIOLITE LATEX 2104 extremely well-suited to the production of pillows, mattresses and other types of cushioning.

PLIOLITE LATEX 2105 is a "cold," high solids, butadiene/styrene latex. It, too, exhibits excellent mechanical stability with light color, high physical properties and low temperature flexibility—for advantageous use in foamed goods where very slight odor is permissible.

In addition to these latices, there are a number of other rubber and resin latices in the PLIOLITE family. Each can be used alone or in combination with the others to obtain specific properties in foam or any of the many applications for latex.

Details plus the latest *Tech Book Bulletins* on PLIOLITE LATEX are yours by writing to:

Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL
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Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

COATINGS DEPARTMENT

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High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Now—A "living textbook" for the rubber industry!

Pictured above is the beginning of a new service to you from Goodyear, the leading supplier of light-colored synthetic rubbers. It's a *Tech Book for the Rubber Industry* – a compilation of technical information on raw materials manufactured by the Chemical Division for use in rubber products.

In the Tech Book, you'll find answers to such questions as: What are the physical properties of PLIOFLEX 1006? Which of the PLIOFLEX rubbers are oil-extended? How does the new CHEMIGUM N-6B differ from its sister nitrile rubbers? How do you compound CHEMIGUM N-7 to meet Specifications AMS 7274C? And you'll also find similar information on PLIOLITE S-6B – the rubber reinforcing resin – and WING-STAY S – a nonstaining antioxidant.

What's more the Tech Book, as it now stands, *is just the beginning.* It's in a convenient, loose-leaf form so that it can be kept alive and up-to-date with periodic bulletins. Write today, on company letterhead, for your *free* Tech Book and the start of the complete story on PLIOFLEX, CHEMIGUM and related products. The address: Goodyear, Chemical Division, Akron 16, Ohio.

CHEMICAL
GOODYEAR
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RUBBER & RUBBER CHEMICALS DEPARTMENT

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic, Wing-Stay—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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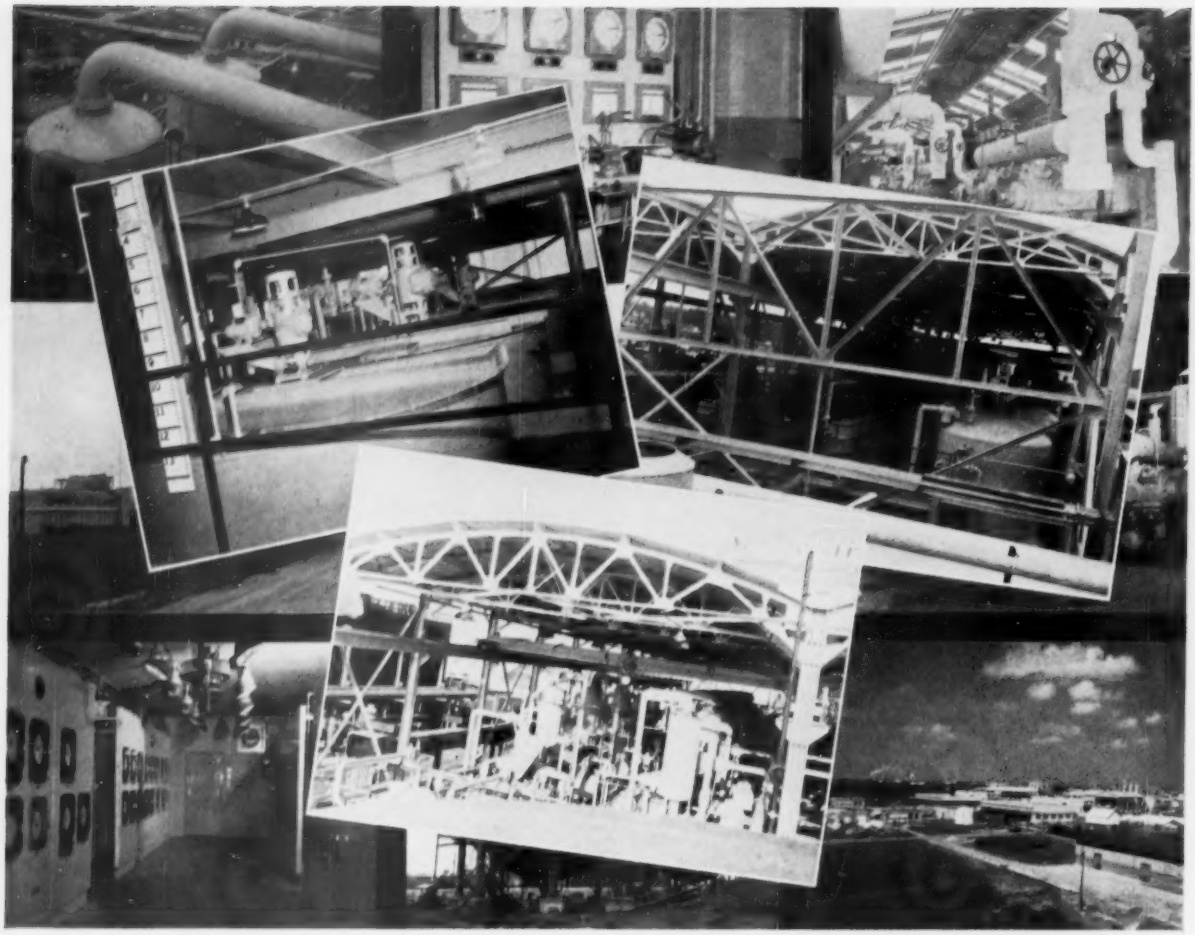
High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

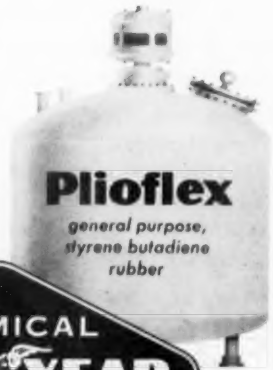


Here's big news, even for Texas!

During its days of Government ownership, the synthetic rubber plant in Houston, Texas, was big and efficient. But since Goodyear assumed ownership in 1955, even the eyes of Texas have been opened by the big changes taking place. For today, with completion of a 50% expansion, the Houston facility has become the world's largest single synthetic rubber plant – and the most modern, too.

What this expansion means to you and the rest of the nation is not only the availability of 220,000 long tons of PLIOFLEX rubbers each year, but the supply of even finer PLIOFLEX rubbers. Continuous polymerization plus the installation of considerably larger reactors, much bigger blending facilities and a more centralized, more accurate system of polymerization controls clearly spell greater quality control and a more uniform product.

This $10,000,000 expansion was undertaken for two basic reasons: First, to provide an adequate answer to the increased demand for the current top-quality PLIOFLEX rubbers. And second, to assure sufficient production facilities for the new, even finer, PLIOFLEX rubbers to come. To find out how the Houston plant and its products, both present and future, fit into your plans, write for details including the latest *Tech Book Bulletins*, to: Goodyear, Chemical Division, Akron 16, Ohio.



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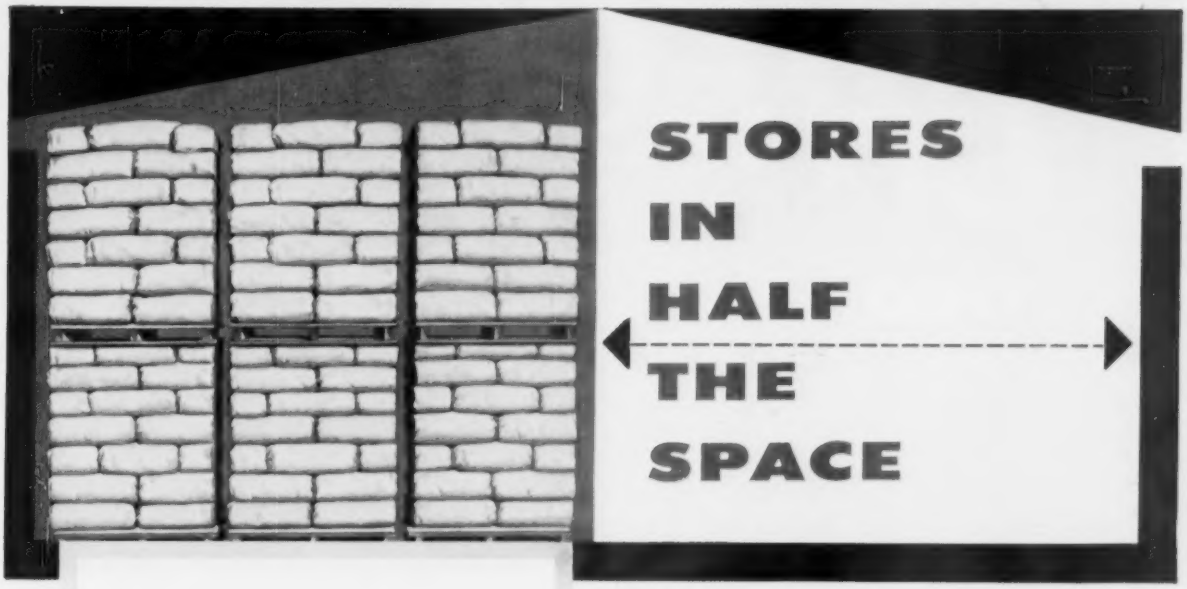
High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

AZODOX

New, Higher Density Zinc Oxide



HERE ARE OTHER IMPORTANT REASONS WHY AZODOX IS BEST FOR YOU

Increased Mixing Capacity. AZODOX incorporates readily, disperses completely in both hard and soft stocks, at high or low concentrations, on the mill or in the Banbury. No hard-crusted agglomerates are present in AZODOX to cause mixing and dispersion difficulties.

Physical Properties Unchanged Except for Density. Surface area, particle size and shape, color and all other physical properties of AZO-ZZZ, American Process, zinc oxides are unaltered. *Apparent density only is changed.* All chemical properties are unchanged.

Flows More Freely, Less Dusting than conventional zinc oxides.

AZODOX Cuts Your Costs. Faster handling, easier storing, quicker mixing save you money.

AZODOX is factory-tested and proved. Now available in sample lots or carload quantities for your use *at the same price of conventional zinc oxides.*

AZODOX available in surface treated form if desired.

AZODOX is a revolutionary new form of zinc oxide (de-aerated). With twice the density, half the bulk of conventional zinc oxides, AZODOX is the answer to your storage problem. AZODOX comes to you in an easy-to-handle small package, shaped to permit closely packed, unitized shipments. *And the perfect texture of the material remains unchanged.*

AZODOX is available in all grades of American process lead-free zinc oxide.

American Zinc sales company

Distributors for
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If you manufacture:	You can get these improved properties:	With these Thiokol Products:
AIR FORCE REFUELING HOSE	Low temperature properties for acrylonitrile rubber tubes and Neoprene type cover.	PLASTICIZER TP-90B
ARCTIC TIRES	Improved low temperature properties.	PLASTICIZER TP-90B
CORK AND FIBROUS MATERIALS	Solvent resistant binder.	FA CRUDE ST CRUDE
COATED ASBESTOS SHEETING	Prevention of solvent evaporation.	A, FA, ST CRUDE
COATED FABRIC FOR GAS METER DIAPHRAGMS	Maximum resistance to gas impermeability with flexibility.	FA CRUDE ST
COATED PAPER AND FELT GASKETS	Solvent resistant coating.	FA CRUDE
DIAPHRAGMS, MOLDED	Low temperature flexibility, solvent resistant. Stocks without plasticizer.	ST CRUDE
GR-S BRAKE CUPS	Plasticizer for low temperatures.	PLASTICIZER TP-90B TP-95

If you manufacture:	You can get these improved properties:	With these Thiokol Products:
MOLDED MECHANICAL GOODS	Low temperature flexibility without the use of extractable plasticizer, increased solvent and compression set resistance.	ST CRUDE
	Increased heat resistance and improved aging properties for nitrile and GR-S rubber with non-blooming characteristics.	VA-7 VULCANIZING AGENT
MOLDED NITRILE MECHANICAL GOODS	Plasticizer for low and high temperature applications.	PLASTICIZER TP-95
"O" RINGS	Low temperature flexibility plus increased solvent resistance. Plasticizer for low temperature flexibility.	ST CRUDE TP-90B PLASTICIZER TP-95 PLASTICIZER
GASKETS	Ultimate solvent resistance.	A, ST CRUDE
PACKINGS	Solvent resistance.	A, FA, ST CRUDE
PAINT SPRAY AND AROMATIC HOSE	Resistance to thinners, lacquers, and solvents.	FA CRUDE
PRINTING AND COATING ROLLERS	Resistance to thinners, lacquers, and solvents.	FA CRUDE ST CRUDE
PROOFED GOODS	Plasticizer for low temperature flexibility.	PLASTICIZER TP-95, TP-90B
PUTTIES	Non-hardening flexible caulking compound.	FA CRUDE
CEMENTS	Solvent resistant coating for paper and cloth.	FA CRUDE
SHEETING	Solvent Resistance.	ST, FA, A CRUDE
TUBING	Low temperature flexibility, solvent resistance, without plasticizer.	ST CRUDE
WIRE AND CABLE	Low temperature flexibility.	PLASTICIZER TP-90B

Thiokol®

PIONEER MANUFACTURER OF SYNTHETIC RUBBER

For more information write: Thiokol Chemical Corporation, 780 North Clinton Avenue, Trenton 7, N. J.

In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario.

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CUT COSTS BOTH WAYS *with* PROTOX®-166

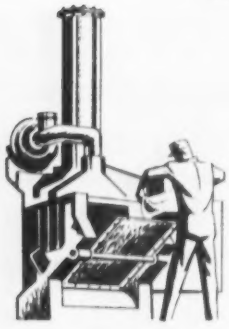
ZINC OXIDE

1. Cut Handling and Storage Costs

Protox*-166 is dense. It bulks only about half that of conventional zinc oxides.

Thus you can handle Protox-166 faster and store it in a smaller space.

2. Cut Processing Costs



Protox-166 is outstanding for dispersion. It disperses readily in any rubber under any weather conditions . . . because it is free of aggregates and its particles are coated with zinc propionate that is readily wet by rubber.

Protox-166 is outstanding for calendering and extruding. It provides smoother calendering with less shrinkage, smoother extruding with less die swell, and longer runs on strainers.

Thus you can cut processing time and step up output with Protox-166.

* U. S. Patents 2,303,329 and 2,303,330

THE NEW JERSEY ZINC COMPANY

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Increase output . . . reduce rejects . . . lower costs with HYDRAULIC PRESSES

engineered for the job by

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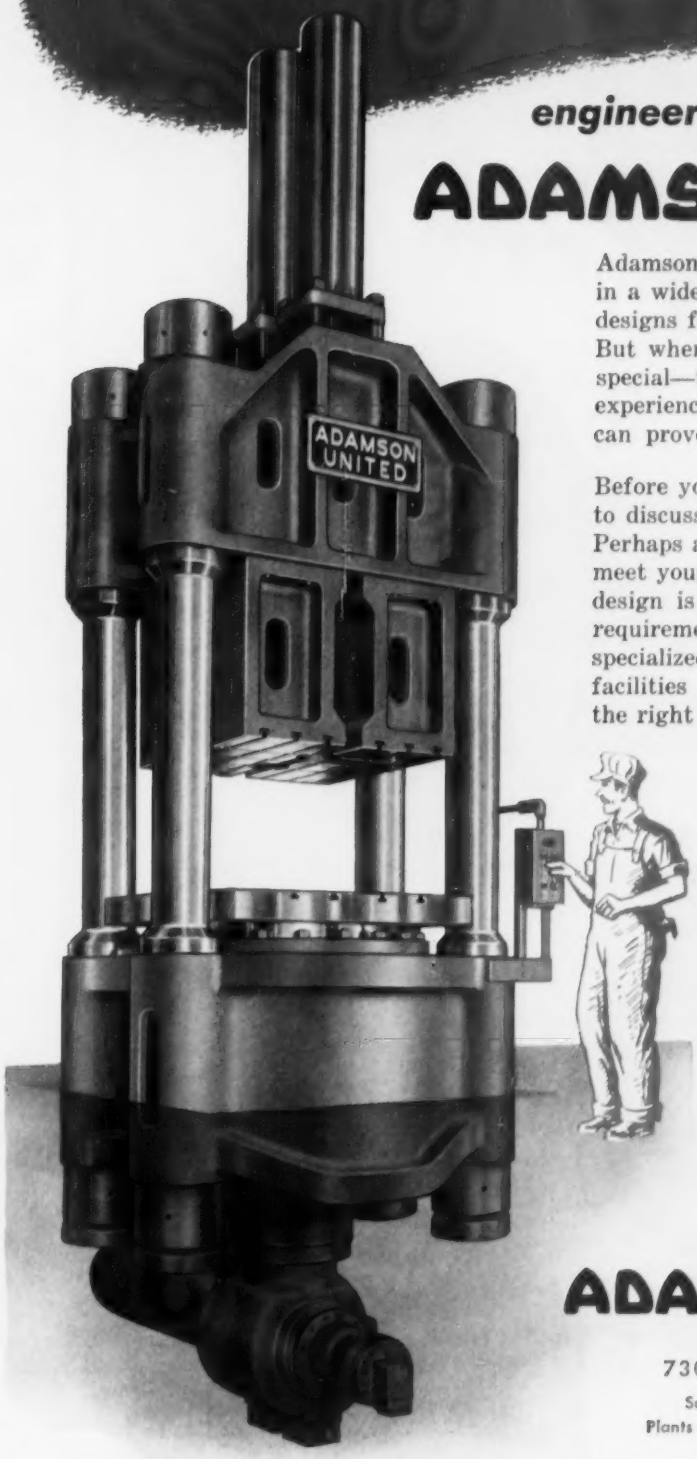

Adamson United Hydraulic Presses are available in a wide range of performance-proved standard designs for the rubber and plastics industries. But when your requirements call for something special—that is when Adamson's extensive experience in press design and engineering can prove most valuable.

Before you buy your next press, we invite you to discuss your problems with Adamson engineers. Perhaps a standard or slightly modified unit will meet your needs. Or possibly a completely new design is indicated. Whatever your specific requirements may be, you can rely on Adamson's specialized engineering and production facilities to recommend and supply the right equipment for the job.

This 2000-ton self-contained transfer molding press is an excellent example of our custom engineering service. Built by Adamson for Orangeburg Manufacturing Company, Inc., this unit is specially designed to produce large molded pipe fittings. Unusually compact, it occupies minimum floor area. Platen size is 54" x 52". A unique system of valving and pumping provides exceptional versatility, permits precision control over a broad range of speeds and pressures.

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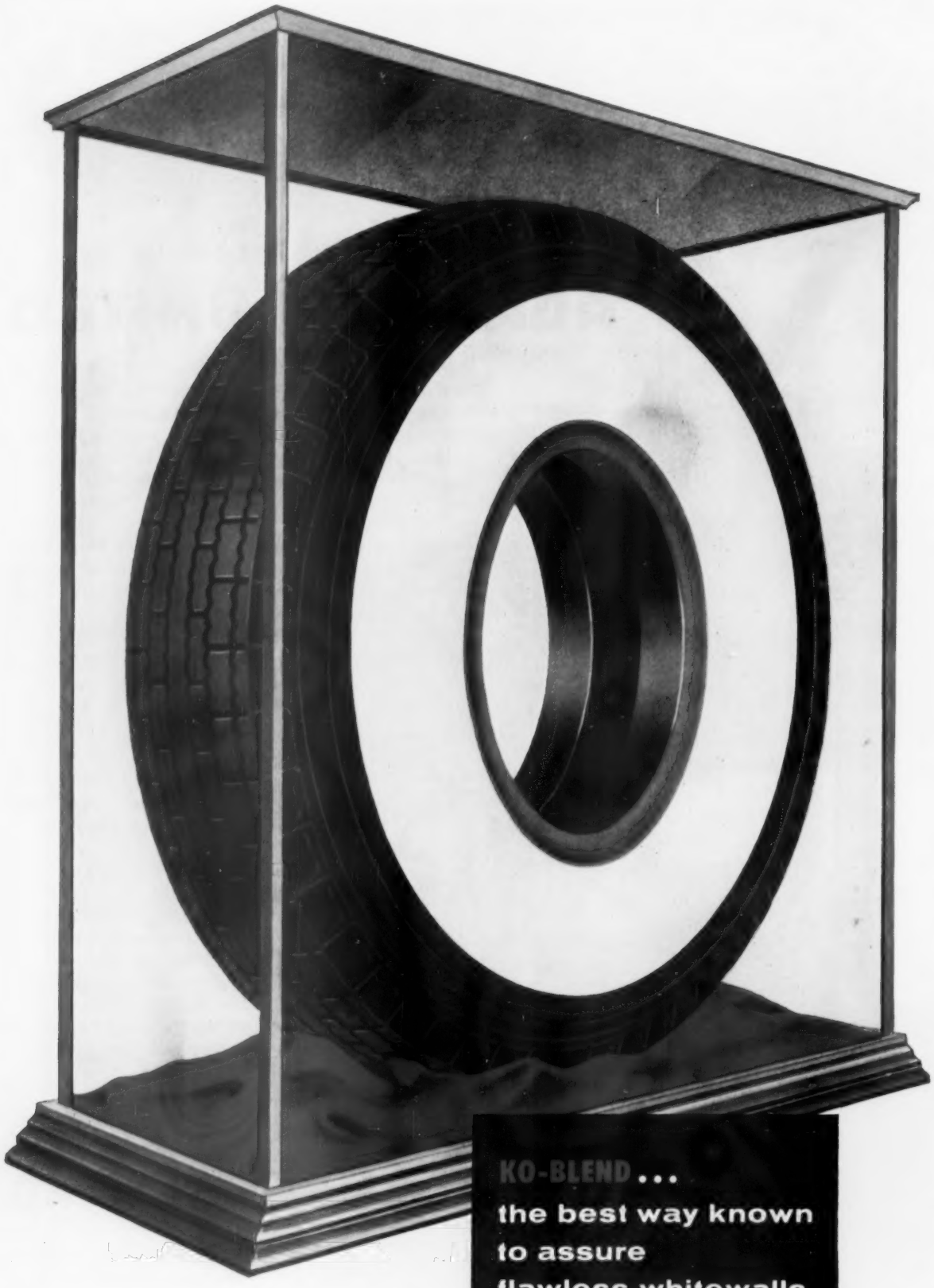
DESIGNERS AND BUILDERS OF BASIC MACHINERY FOR THE RUBBER, PLASTICS AND PLYWOOD INDUSTRIES



KO-BLEND . . .
the best way known to assure flawless whitewalls

In white sidewall stock,

KO-BLEND

is your protection against

- SULFUR BLOOM
- POOR SULFUR DISPERSION
- MOLDING DEFECTS

For less than ½¢ per whitewall tire you can add the small amount of Ko-Blend necessary to reduce rejects and reworks to a minimum. Ko-Blend is a latex-compounded masterbatch containing 85% insoluble sulfur which has been colloidally dispersed in GRS latex.

The extremely short milling time necessary to incorporate Ko-Blend makes it possible to maintain high Mooney viscosity in whitewall stocks while overcoming processing difficulties encountered when other types of sulfur are used. For samples and further information on how Ko-Blend eliminates spots, streaks and batch softening, write to:

THE GENERAL TIRE & RUBBER COMPANY
Chemical Division
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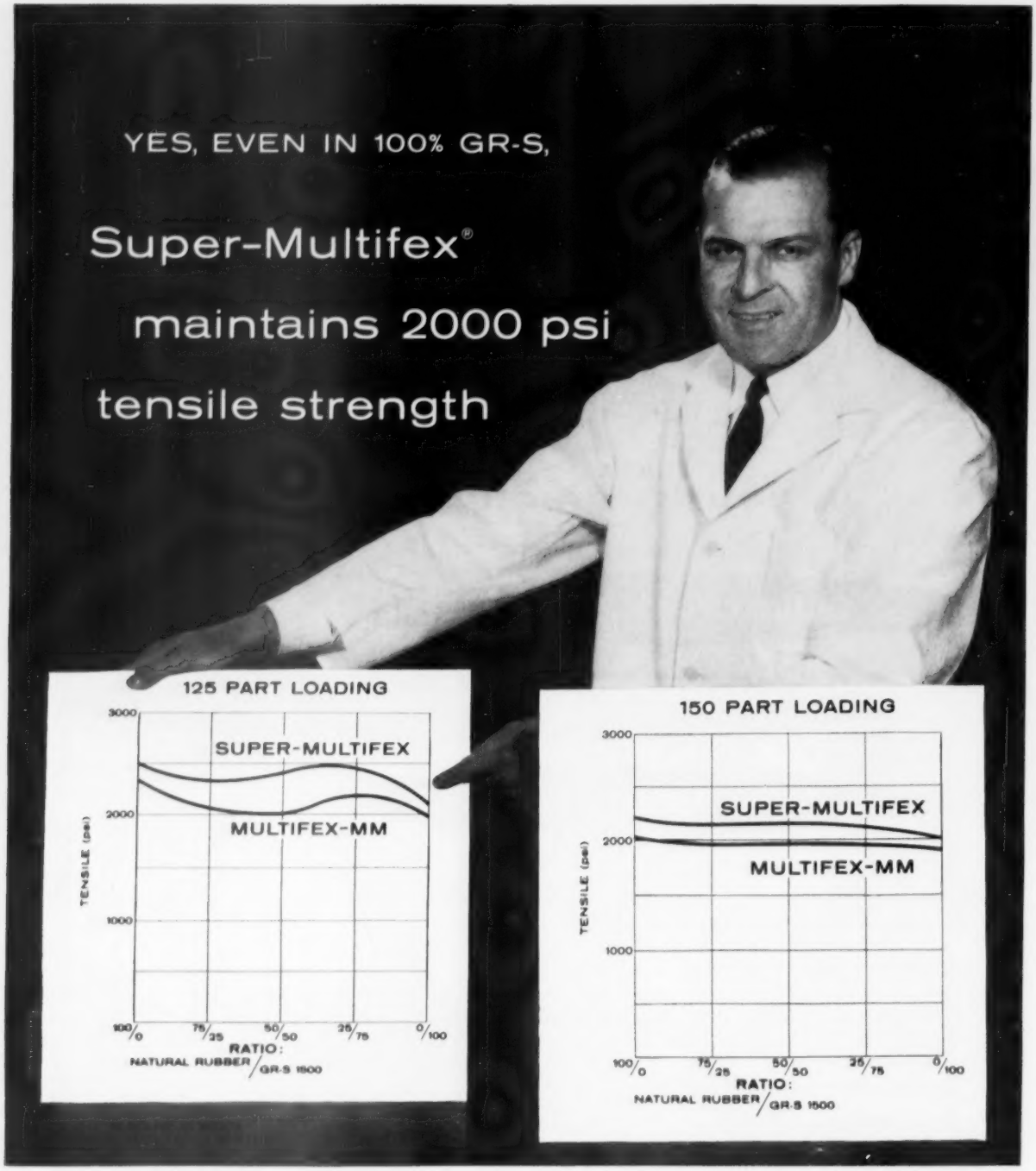
Creating Progress Through Chemistry

Chemical Division GENERAL
THE GENERAL TIRE & RUBBER CO.
KO-BLEND



Now you can use DIAMOND Super-Multifex in your GR-S compounds—even in those with *no* natural rubber—and be sure you're getting at least 2000 psi tensile strength.

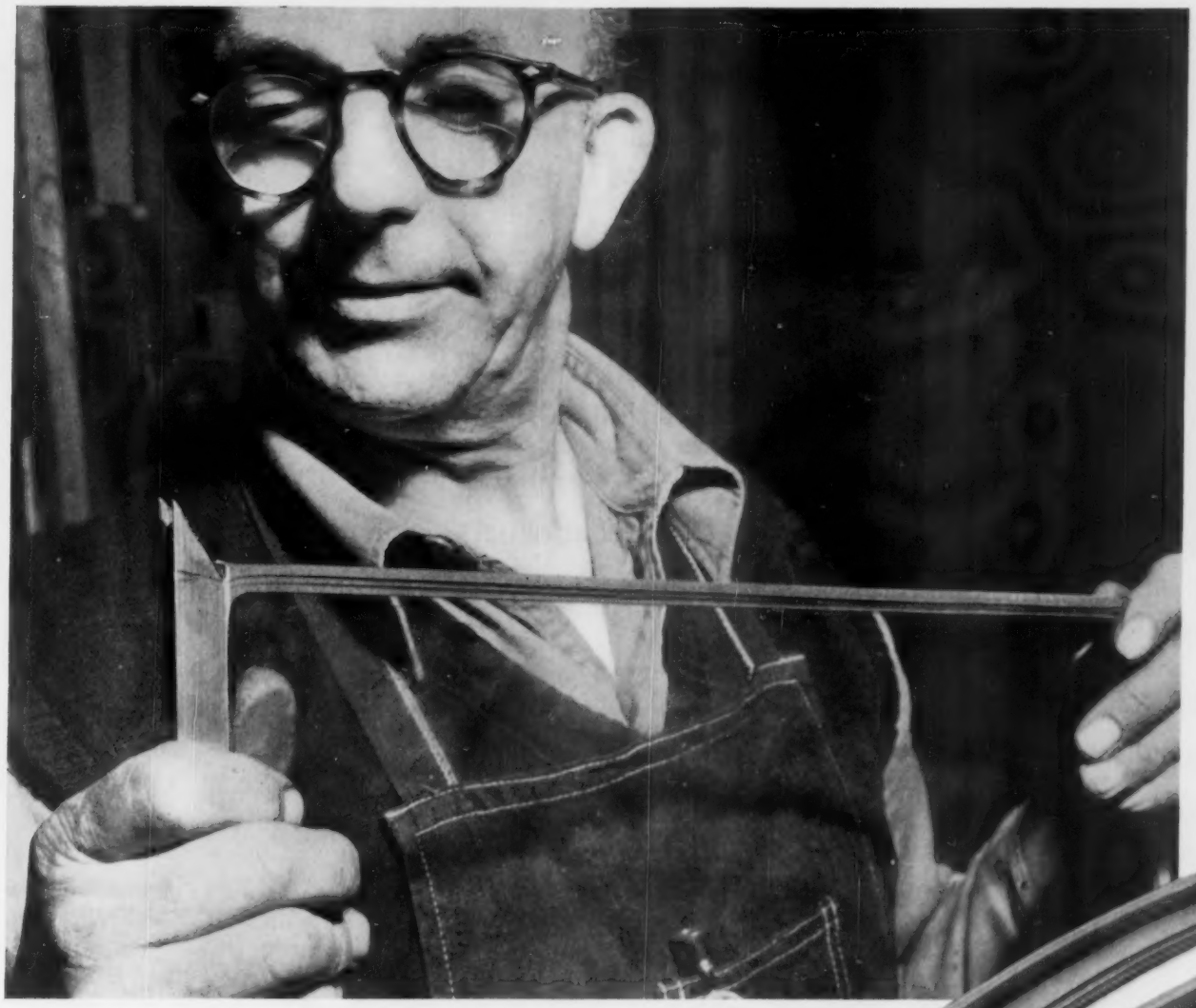
Contrast the performance of Super-Multifex and Multifex-MM® with the much lower tensiles normally obtained in compounds containing ground limestone.

DIAMOND's ultra-fine Super-Multifex (.03 micron) precipitated calcium carbonate has extremely uniform particles, coated to aid dispersion, mixing and processing.

Multifex-MM, also shown on the graphs, is an uncoated, ultra-fine (.04-.06 micron) precipitated calcium carbonate. You can see how it consistently reinforces GR-S, too.

Try either Super-Multifex or Multifex-MM in your next batch to improve physical properties. Call your DIAMOND Representative today. He can supply information and technical help on these and other high-grade calcium carbonates. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Bldg., Cleveland 14, Ohio.

Diamond Chemicals



A million vinyl splines...

not one complaint

Here comes another storm window set to give a lifetime of trouble-free service. It's being fitted with a spline extruded from BAKELITE Brand Vinyl Plastic.

Over the past four years Monarch Products Corp., Chicago, Ill., has produced and sold a million storm windows and doors so fitted. There has never been a complaint.

The extruder, Jarrow Products Company, also of Chicago, gave the splines an accelerated sun, weather, and dirt test that equalled ten years' exposure. Examination showed that the BAKELITE Vinyl Plastic kept its flexibility and underwent almost no color change. This material is resistant to ice, snow, heat, cold, water, and chemicals.

There are several formulations of BAKELITE Vinyl Resins available to help you get the right combination of properties for your extrusion application. For full information, write Dept. YW-167.

BAKELITE
BRAND
PLASTICS

UNION CARBIDE

BAKELITE COMPANY, *Division of Union Carbide Corporation* 30 East 42nd Street, New York 17, N. Y.

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HYPALON® IS

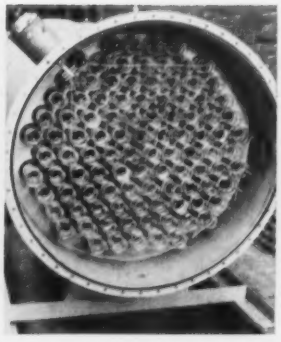
Effective July 26, the price of HYPALON* 20 has been reduced to 70¢ a pound, f. o. b. Beaumont, Texas. This reduction creates new sales opportunities for makers of rubber products. • Because of its marked superiority in resistance to oxidation, chemicals and ozone, and its

*Reg. U. S. Pat. Off.

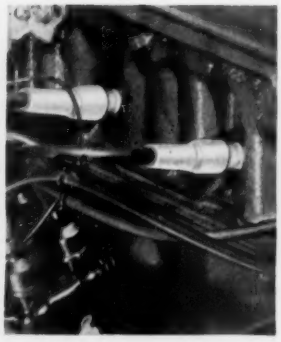
Here are applications where rubber chemists have used the outstanding

TARPAULINS
HYPALON for resistance to scuffing, sun and weather

CONVERTIBLE TOPS
HYPALON for weatherability, color stability and cleanability



OZONE GENERATOR GASKETS
HYPALON for ozone resistance

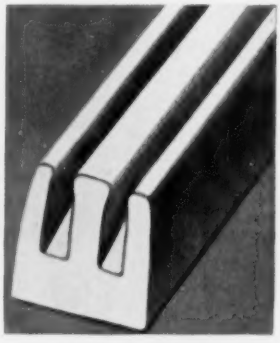


SPARK PLUG BOOTS
HYPALON for heat and ozone resistance

ACID HOSE
HYPALON for resistance to strong acids

WEATHERSTRIP COATINGS
HYPALON for sun and weather resistance, color stability

COLORED PHONE CORDS
HYPALON for scuff resistance and color stability



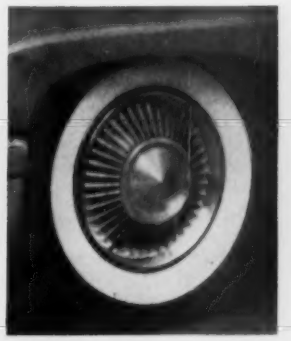
AIRPLANE WINDOW SEALS
HYPALON for sun and weather resistance, color stability

REDUCED 15¢

ability to take on and retain brilliant colors, HYPALON can be used in applications where other types of rubber have proved inadequate or completely unsuitable. And with the reduced price, goods made with HYPALON can now be offered at much more attractive prices.

properties of HYPALON to create new products or make existing products better

INDUSTRIAL ROLLS
HYPALON for heat and chemical resistance



WHITE SIDEWALLS
HYPALON blends for atmospheric ozone resistance, color stability.

HOT CONVEYOR BELTS
HYPALON for abrasion and heat resistance

LINEMAN'S BLANKETS
HYPALON for corona-cutting and ozone resistance

Want more information? Your Du Pont representative will be glad to discuss HYPALON with you.

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HYPALON
SYNTHETIC RUBBER

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BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

Goodrich-Gulf Chemicals, Inc.

Ameripol... HOT POLYMERS

Types	Physical Properties*		Selection Guide
1000	Tensile	3030 psi.	General purpose rubber for products where color unimportant. Used for tires, molded and extruded products.
	Elongation	600 %	
	Modulus @ 300% Elongation	980 psi.	
	Mooney Viscosity—		
	ML212°F. @ 4 minutes		
	Raw Polymer	48	
	Compounded Stock	55	
1001	Tensile	3030 psi.	Similar to 1000, but less staining and discoloring. For tires, shoe soles and heels, molded and extruded products.
	Elongation	600 %	
	Modulus @ 300% Elongation	1010 psi.	
	Mooney Viscosity—		
	ML212°F. @ 4 minutes		
	Raw Polymer	47	
	Compounded Stock	55	
1002	Tensile	3000 psi.	Rosin acid soap provides more processing tack and lower modulus than 1000 and 1001. For tires, molded and extruded products.
	Elongation	650 %	
	Modulus @ 300% Elongation	950 psi.	
	Mooney Viscosity—		
	ML212°F. @ 4 minutes		
	Raw Polymer	53	
	Compounded Stock	55	
1006	Tensile	2850 psi.	An improved, lighter colored rubber, relatively non-discoloring and non-staining. For white and pastel colored products—tile, toys, side walls, etc.
	Elongation	590 %	
	Modulus @ 300% Elongation	1010 psi.	
	Mooney Viscosity—		
	ML212°F. @ 4 minutes		
	Raw Polymer	50	
	Compounded Stock	58	
1007	Tensile	2760 psi.	Relatively low water absorption, improved electrical properties. For insulation and electrical products, gaskets, etc.
	Elongation	620 %	
	Modulus @ 300% Elongation	890 psi.	
	Mooney Viscosity—		
	ML212° @ 4 minutes		
	Raw Polymer	48	
	Compounded Stock	54	
1009	Tensile	1850 psi.	A cross-linked polymer used with other polymers to reduce shrinkage and die swell in calendering and extrusion. For footwear, insulation, calendered goods.
	Elongation	360 %	
	Modulus @ 300% Elongation	770 psi.	
	Mooney Viscosity—		
	ML212°F. @ 4 minutes		
	Compounded Stock	126	

*Typical average, production values. Cure 50′ at 292°F.

Hot polymer man-made rubber easily processed... furnished in bale or crumb form

Ameripol is the preferred butadiene-styrene rubber . . . superior or equal to natural rubber in aging, resistance to wear, weathering, water, oil, permeability to gases.

The hot polymer grades are most easily processed. Furnished in compressed bale form for molded and extruded products; in crumb form for solubility in adhesives, mastics, cements. Because of low molecular structure, Ameripol hot polymers go into solution easily and quickly.

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Another first from Monsanto

SANTONOX . . . a low-cost method for stabilizing polyethylene during processing . . . and reducing "greasiness" of finished product.

With as little as .02% Santonox mixed in the batch, extrusions are practically identical to die orifice.

Versatile though it is, the ubiquitous polyethylene polymer gives the processor certain worries . . . one of which is a lively instability during extruding, blowing, and—to a less degree—during molding. Major trouble is caused by the heat applied in the mixing, milling, and pressuring to shape. Heat causes cross-linking or scission in the molecule. Cross-linking creates a host of headaches: a reduction of flexibility; discoloration; lowered melt flow. But more painful than these to the processor extruding cable insulation, heat-induced cross-linking causes troublesome "swelling" as the polyethylene extrudes through the orifice and the composition develops a higher electrical-dissipation factor.

Chemically, the remedy was at hand: 4,4'-thiobis-(6-tert-butyl-m-cresol), highly purified, trade named Santonox. Some collaborative study quickly proved how well it *stabilizes* general-purpose and electrical-grade polyethylene against heat degradation.

So little does the trick! Just 0.03% on the weight of the polymer. Checked by ASTM Flow Measurement DI238-52T, the melt index remains constant for the full 45-minute heating. By "Percent-Recovery" test, after 45 minutes of milling, polyethylene with 0.03% Santonox shows only a 5% increase in the index over the unmilled resin. Two other commercial antioxidants tested in parallel show 102% and 83% increases at the same concentration. And even at 1%, these antioxidants permitted an increase in the Percent-Recovery of 18% and 30%, respectively. On the electrical properties side, polyethylene with a concentration of 0.05% Santonox retains virtually the *same dissipation factor after 2½ hours' milling.*

This little that does so much contributes something still more: the presence of 0.03-0.05% Santonox prevents exudation from the surface. Consequently, finished products are noticeably less "waxy" or greasy to the touch.

The finely crystalline Santonox can be added by either the polyethylene user or the manufacturer of the molding compound. It has been approved by the FDA up to a level of 0.05% in high-pressure polyethylene.

Monsanto's Rubber Chemicals Department will be glad to supply a test sample of Santonox or forward you the names of polyethylene producers whose compounds are supplied already stabilized. Write or call today.

Accelerators—For fast, slow, and regulated rates of safe cure

Antioxidants — For maximum oxidation resistance

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...and no need to change compounds

New improved 1703, 1707 and 1708 SYNPOLS meet with unprecedented acceptance in less than 3 months!

Though offered to TEXUS customers less than three months ago, the new 1703, 1707 and 1708 SYNPOLS have already been adopted for all existing uses of these polymer types.

The reasons? These new TEXUS SYNPOLS proved to be 100% interchangeable... number for number... with previously used dark-colored, oil-extended rubbers of the same types. They also answered the need for light-colored rubbers extended with an oil which is non-volatile at the high temperatures experienced in modern high-speed mixing equipment.

Resulting from the development of a new, non-volatile pale naphthenic oil used exclusively in TEXUS SYNPOLS, these improved polymers offer the technical advantages of:

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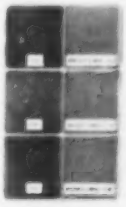
LOW WATER ABSORPTION*—resistance to water absorption is a vital consideration in such products as athletic equipment, industrial rollers and various types of mechanical goods;

EASE OF PROCESSING—necessary in smooth-finish calendered products such as waterproof sheeting.

(Technical data available on request.)

Extensive factory tests and current use of the new 1703, 1707 and 1708 SYNPOLS in product manufacture by present TEXUS customers eliminate your need of extensive testing when adopting these light-colored polymers for your present product line. In addition, the outstanding characteristics of these improved SYNPOLS now offer exciting possibilities for your new product development. Call on TEXUS Technical Service for complete assistance.



THE CASE FOR SYNPOLS

This convincing comparison case shows the new 1703, 1707 and 1708 SYNPOLS side by side with dark rubbers of the same numbers. Your TEXUS representative would like the opportunity to show it to you and, at the same time, give you complete information on the entire line of TEXUS SYNPOLS. It's easy to find out how your product line can benefit from these new developments by TEXUS—just write, wire or phone today.

*SYNPOL 1708 has low ash content and water absorption values similar to those formerly found only in premium priced rubbers.

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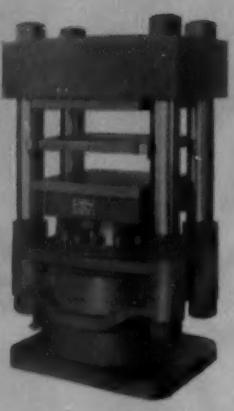

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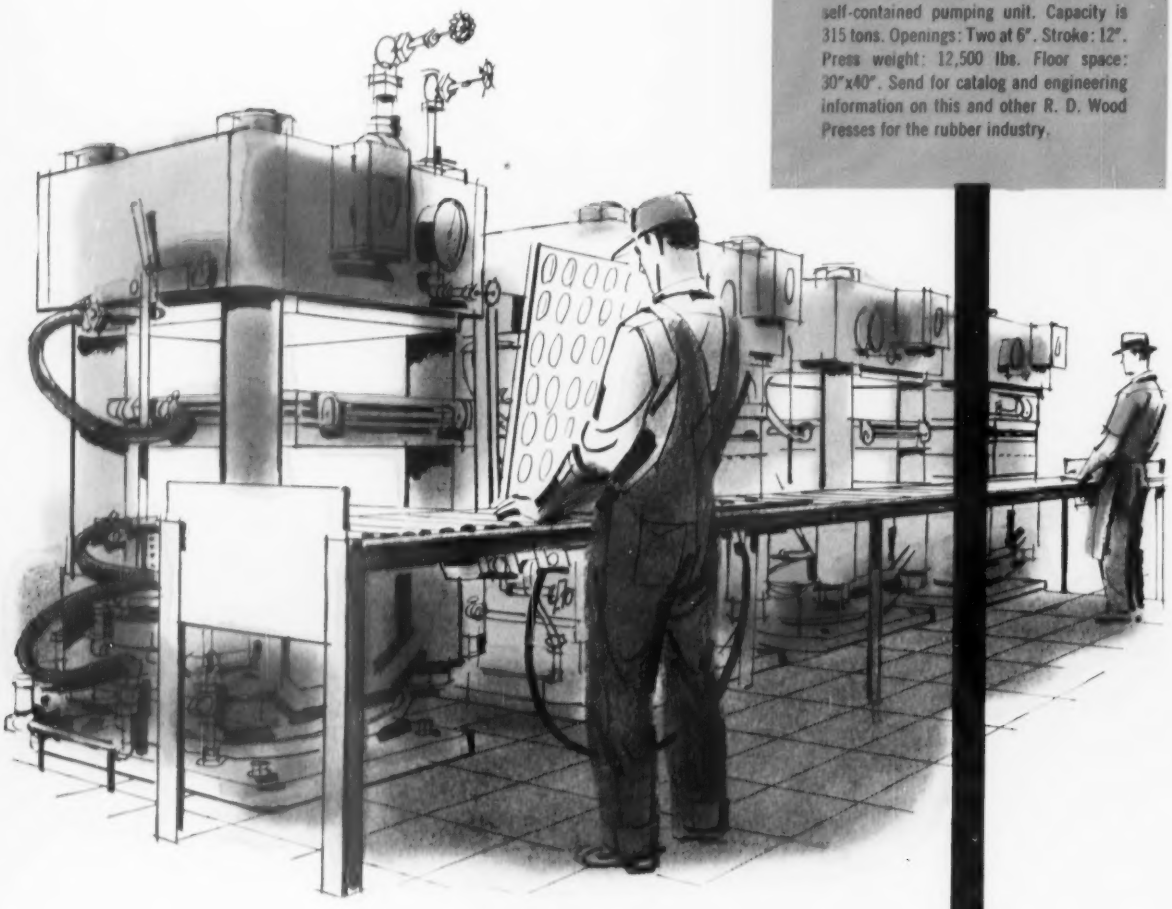

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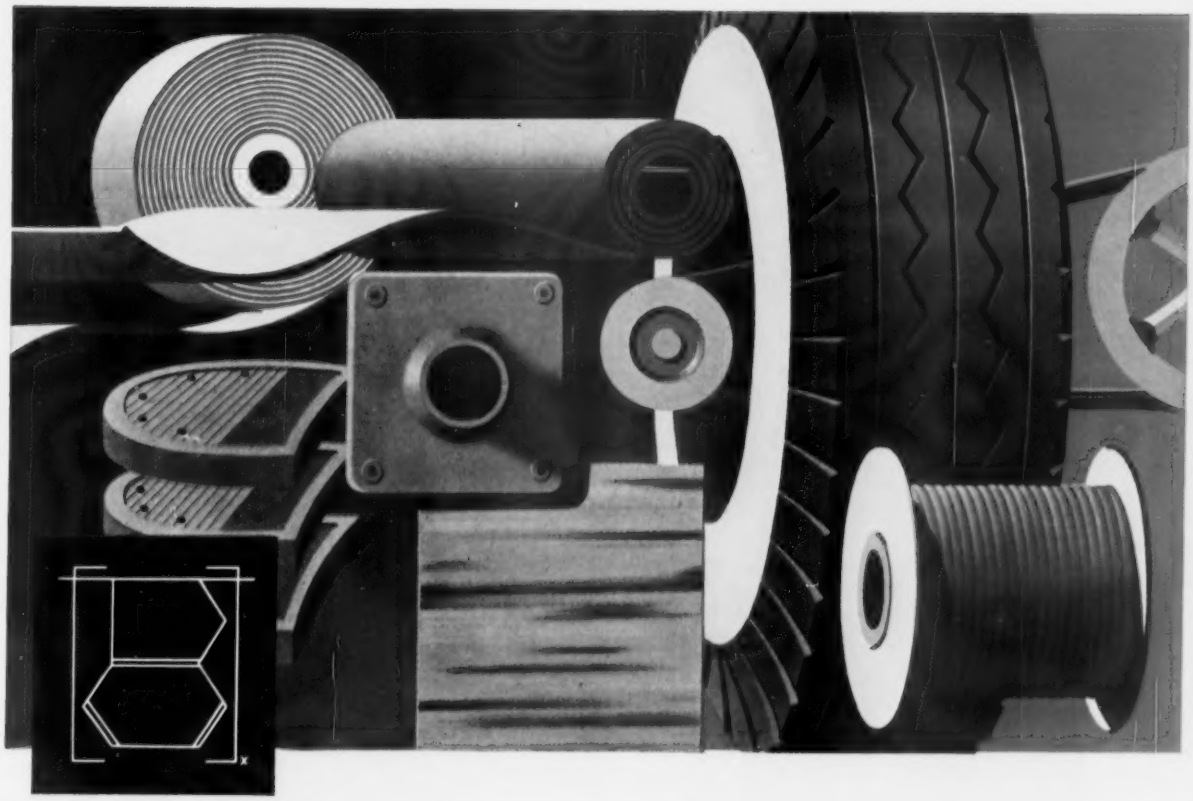

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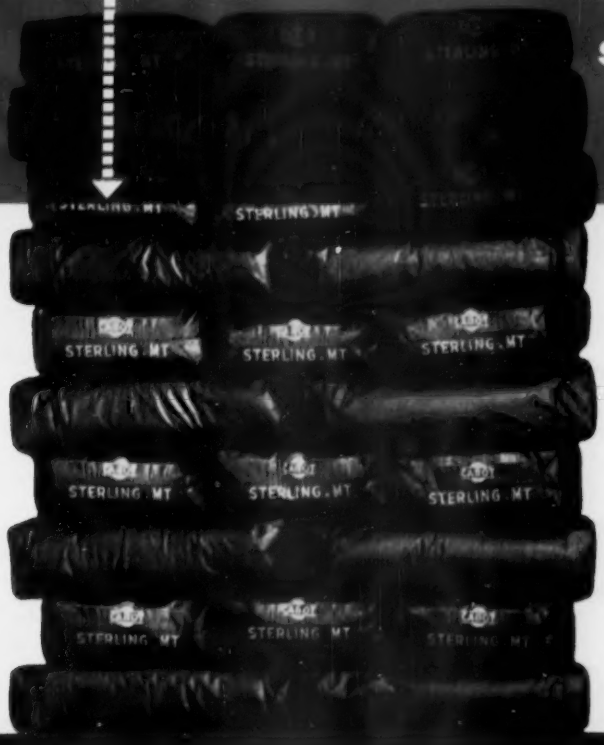
stores in 27½% less space



50 lbs. regular MT take 1.35 cu. ft. space
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New Sterling MT provides 27½% storage savings, because it is made to have a 25-30% higher density than regular MT. It is specifically manufactured to be free-flowing . . . to look and act almost like regularly pelleted black . . . in order to give you maximum advantages — and savings. Remember, at no extra cost, new MT flows more quickly and easily from the bag, incorporates faster into the batch, offers improved mixing characteristics with unchanged vulcanizate properties . . . AND it results in easier handling, quicker weighing, better unit loads, cleaner and more economical plant working conditions. If you haven't already tried it, send for free samples of new Sterling MT today . . .

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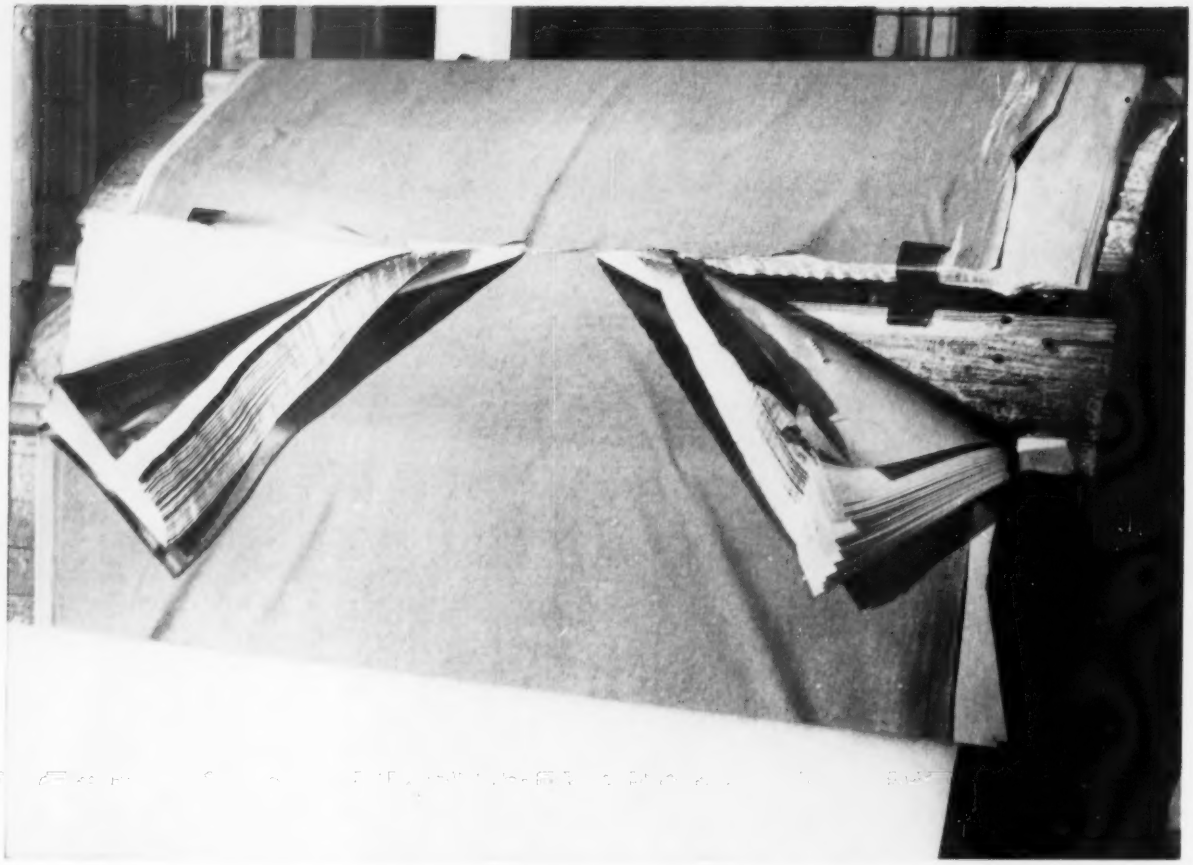

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- Where cleanliness is essential, Linerette is a low cost lining for trays and containers.
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Linerette is available in any width up to and including 54", in rolls of 9", 11½", 13" and 15" diameters, on cores of 3" i.d. The yield is approximately six square yards to the pound. A 9" roll contains 375 linear yards and a 15" diameter about 1150 linear yards. Ask for a sample today, just specify desired width.

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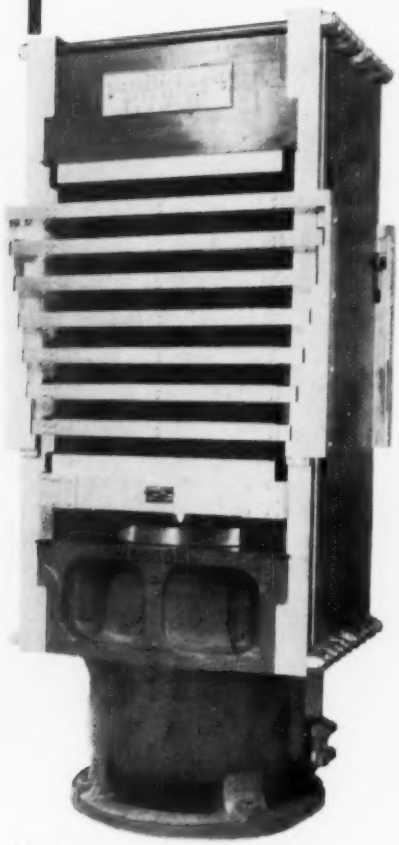

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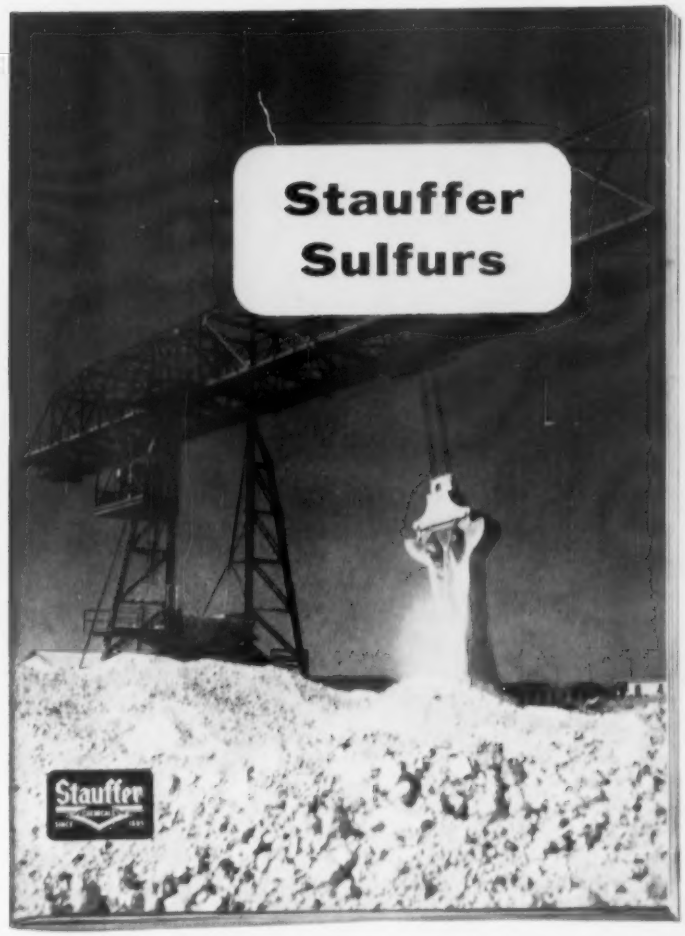

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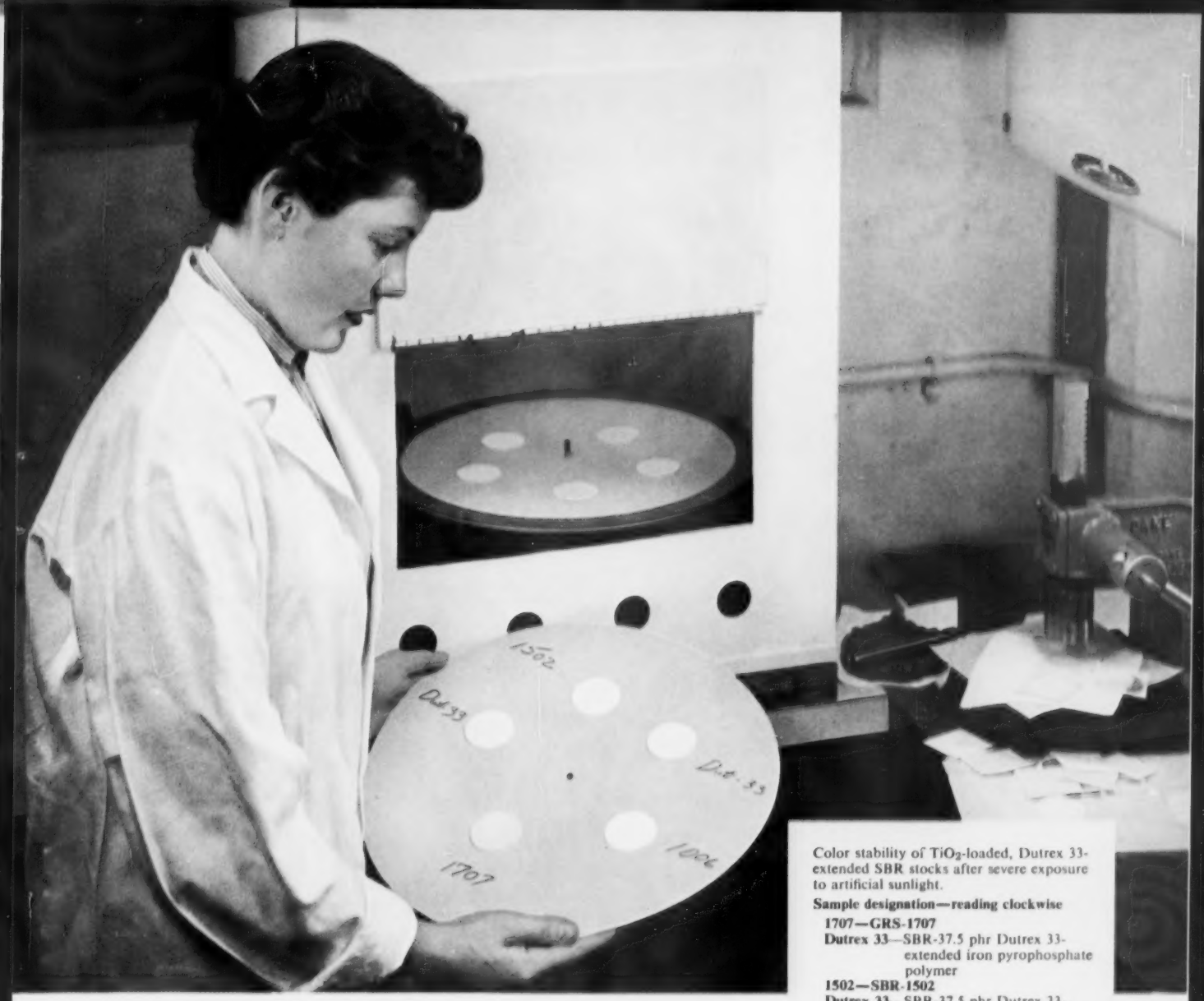


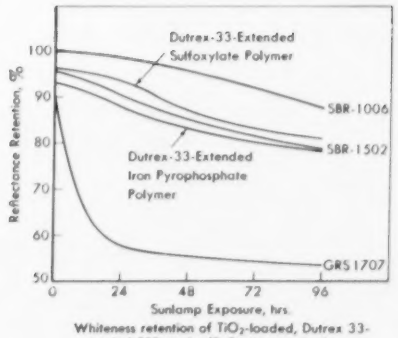
Color stability of TiO_2-loaded, Dutrex 33-extended SBR stocks after severe exposure to artificial sunlight.

Sample designation—reading clockwise

1707—GRS-1707
Dutrex 33—SBR-37.5 phr Dutrex 33-extended iron pyrophosphate polymer
1502—SBR-1502
Dutrex 33—SBR-37.5 phr Dutrex 33-extended sulfoxylate polymer
1006—SBR-1006

Non-staining extending oil

for light-colored rubber stocks



Whiteness retention of TiO_2-loaded, Dutrex 33-extended SBR stocks. (Reflectance retention compared to unexposed S-1006 control.)

Shell Dutrex® 33 is a superior naphthenic extender for SBR combining extremely light color and outstanding color stability with good compatibility and low volatility. This attractive balance of properties now provides practical oil-extended SBR stocks with staining and discoloration resistance approaching the best oil-free SBR types.

The outstanding resistance of Dutrex 33-extended SBR stocks to discoloration by severe sun lamp exposure is shown in the accompanying illustrations. Results indicate that Dutrex 33-extended SBR may serve in some applications where critical discoloration and contact or migration staining resistance have previously demanded use of oil-free types.

For additional information, write or call Shell Oil Company, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

SHELL DUTREX 33

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SHELL SYNTHETIC RUBBER

IF YOU WANT the tile you make to be the *best* . . . if you're looking for brighter colors and better color stability . . . use improved Shell S-1006 hot or S-1502 cold rubber.

Both are excellent for other products, too—light-colored mechanicals, sporting goods, shoe soles and heels.

The Shell Chemical plant at Torrance, California produces a full line of butadiene-styrene-type synthetic rubber to fill the needs of large and small Western manufacturers. Available types include hot, cold, oil-extended and black masterbatch rubber as well as hot and cold latices.

Whatever you manufacture from rubber, convenient location and diversity of product make Shell Chemical your logical rubber source in the West. Remember too—Shell's Technical Service Laboratory is ready to help you find practical solutions for troublesome technical problems.

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SHELL CHEMICAL CORPORATION
Synthetic Rubber Sales Division
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SHELL

Capitol Cues

FEAR OF INFLATION IS ON THE RISE again in Washington these days—just when the slowdown in business made it seem as if the danger was over. Some officials see the possibility of a new wave of price pressure as big as the surge of the last 12 months. At the same time—paradoxically—they do not see much more than a mild pick-up in business occurring in months ahead.

There are many causes given for the pressure now building up.
- Government spending—state, local, federal—is rising fast, adding substantially to total demand for goods and services.
- Business investment in new plant is at peak and still rising. Expanding firms compete with government for skimpy savings.
- Past hikes at wholesale are just reaching the consumer level.
- Big wage gains many unions are winning this year threaten to exceed productivity. Higher wage costs mean higher prices.

And there's danger that an inflationary psychology may develop. Everyone may come to accept price rises as inevitable. Then there'd be a rush to spend to beat out expected price hikes.

THE WAGE INCREASES UNIONS ARE WINNING these days are bigger than was expected at the year's start. They are topping the big hikes of 1956. Recent tabulations of scores of contract settlements show that the average increase runs between 12¢ and 12½¢ an hour. This compares with an average of 10.3¢ in 1956. Improvements in fringes are bigger than expected too. Deferred hikes in long-term contracts, plus price escalators, are to blame.

Workers in non-manufacturing are doing better than those in manufacturing—13¼¢ as against 11¼¢. In machinery, the hikes center around 14¢; in oil, 12¢; in trade, 8¢; in rubber, 11¢; in lumber and wood-working, 8-9¢; and in instruments, 10-12¢.

SOME FIRMS ARE REVIEWING EXPANSION PLANS with a view to enlarging them before construction and equipment costs go any higher. This prudence could bring capital spending to another new record and give business a nice lift. But if everyone tried to beat the rise at the same time, the pressure would be enormous and even tighter monetary curbs would have to be imposed.

DON'T BE IN A HURRY TO CUT INVENTORIES these days, even though the present leveling is partly a by-product of excess stocks. That's the advice some government economists are now giving. For one thing, they note, the excesses obtain in relatively few lines. For another, too much liquidation could mean loss of sales later on. And if you could get the stock needed, it would be available at higher prices. Finally, the continuing tightness of money would probably make bank loans harder—or more costly—to arrange.

HOW CAN MONEY CONTINUE TO BE SO TIGHT when commercial bank loans so far this year have not risen nearly as much as in the same period of 1956? This has puzzled many businessmen, so here are some figures to explain it.
- Commercial loans of leading banks have risen some $500 million since the start of the year. Last year's rise was $2 billion.
- New flotations by corporations are running $1.5 billion ahead of last year. They are borrowing from the public, not banks.
- Redemptions of Series F and G Savings Bonds held by investors are $1 billion ahead of 1956—the cash going into corporates.

In other words, Treasury is now meeting the demand for money.

Continued on Next Page

DON'T RULE OUT AN INCOME TAX CUT next year, despite the President's warning of a veto. High Administration officials hint that the White House attitude is not as firm as it has appeared. Reports from GOP leaders have convinced Eisenhower's advisers that the public grimly wants lower spending and taxes. They're beginning to think that a tight rein on spending might actually save enough in the new fiscal year to finance some relief—even if Congress itself doesn't really slash and trim enough to make cuts possible.

> The President may even propose a cut himself some time after the first of next year. That way some of the political credit would accrue to the Republicans. The relief would be limited to individuals. That alone would cost the Treasury from $2 to $3 billion—the very most that stringent Executive Branch economy would yield. Corporations would still have to wait.

RESEARCH AIDS AVAILABLE TO SMALL CONCERNS—and how they may best be used in new product development and distribution—will be the subject of a conference to be sponsored this Fall by the U. S. Government's Small Business Administration. The meeting will hear reports on the research results of government agencies, universities, and others. The time: September 24-26. The place: Washington, D. C. Local SBA offices can provide all the details.

> Three new booklets just published for small business:
> •On profits, "Pricing and Profits in Small Stores" tells how to meet price-cutting competition without cutting yourself.
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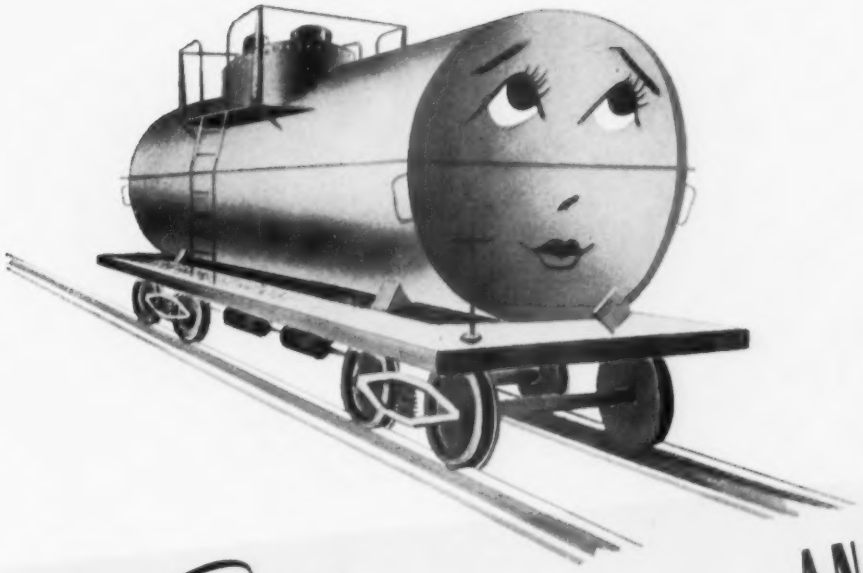

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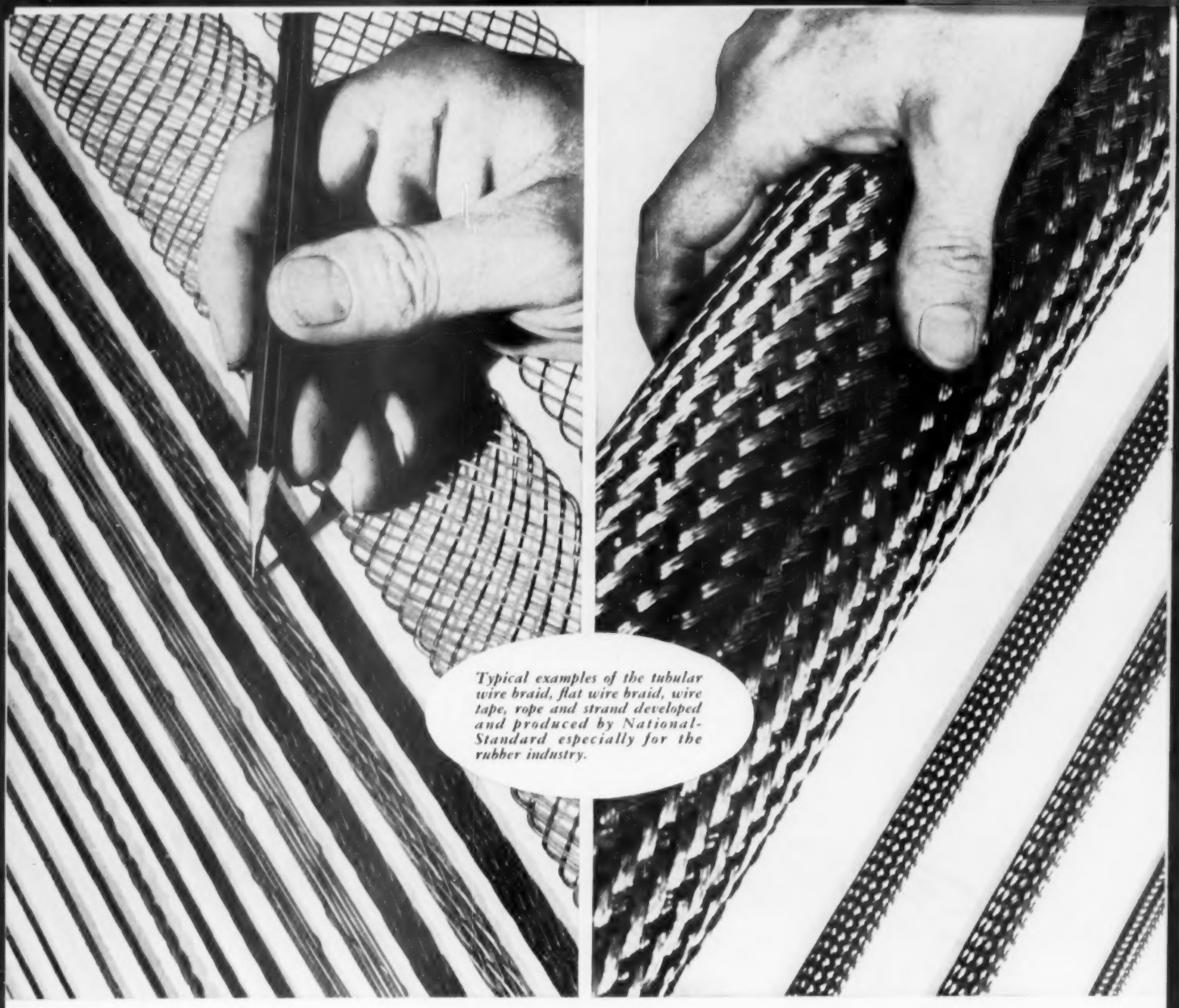

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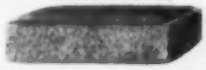
	NON-PIGMENTED 	PIGMENTED WITH PHILBLACK*
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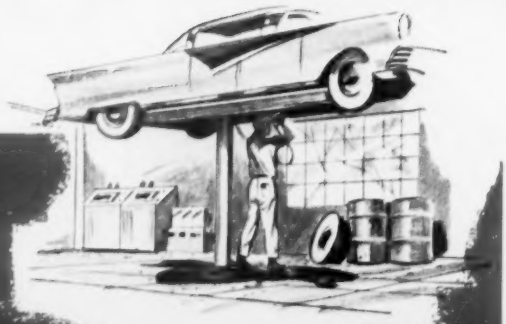

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Rubber Age

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Friction of Rubber on Rough Surfaces

The authors describe a proposed mechanism by which rubber is lost, permitting a prediction of the merit of tread materials on laboratory data

By F. W. BOGGS and W. P. RIEMEN

General Laboratories, United States Rubber Co., Passaic, N. J.

THIS paper is primarily concerned with the physics of abrasion. Its object is to describe a proposed mechanism by which rubber is lost, and thereby permit a prediction of the possible merit of tread materials on the basis of laboratory data. The unreliability of abrasion machines is proverbial in the rubber industry, yet with the growing number of possible synthetic rubbers, an evaluation of each rubber by road tests alone is quite impractical. For this reason other methods of prediction are becoming imperative.

The forces responsible for the loss of rubber during abrasion cannot be measured directly or in detail since they are the result of the interaction between the complicated shape of the abrading surface and the rubber. However, their average value is given by the frictional force. The frictional force is therefore a measure of how much effort is required to cause pieces to break away from a rubber surface, and the study of the frictional force during abrasion should throw considerable light on what is going on. To make these measurements a method of measuring the frictional force and the abrasion simultaneously is required.

We therefore decided to construct a machine with which we could simultaneously measure frictional force and abrasion. The Lambourn *(1)* abrader has been growing in popularity for some time. From our point of view its principal advantage is its great flexibility. In using this machine the sample, in the shape of a small wheel, is driven in contact with an abrasive wheel or disc to which a braking force is applied. Its basic principle has been given elsewhere, consequently we will give no details except of those features which appear to be novel.

Design of the Abrasion Machine

The principal features of our machine, seen in Figure 1, were obtained from Howland *(2, 3)* and Zapp *(4)*. Indeed, except for the brake and some minor alterations, the machine was built from drawings obtained from Howland. However, while Howland uses a pump circulating oil for a brake and Zapp uses a Foucault current disc, our machine uses a DC motor driven as a generator with external field excitation. Both the Foucault current disc and the oil circulation have certain disadvantages. Some workers complain that in the first the energy all appears in the copper disc as heat, which may be hard to dissipate. This difficulty is discounted by others.

From our point of view the Foucault current disc has the disadvantage that there is no simple relationship between the torque and the current to the field of the brake. This means that should one wish to measure the

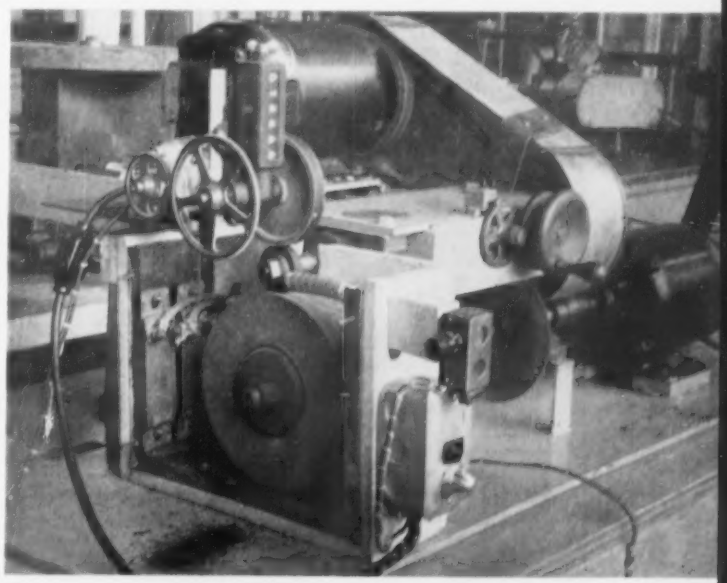


FIG. 1—Abrasion machine designed to measure simultaneously frictional force and abrasion.

Note: This paper was presented before the Division of Rubber Chemistry, American Chemical Society, at Atlantic City, N.J., September 21, 1956.

torque, it would be necessary either to make special provisions or to calibrate the brake in terms of the current. The oil pump does not suffer from the first disadvantage, but it does from the second.

The replacement of a specially constructed element with a standard one which can be purchased on the open market is obviously a good way of reducing cost of construction as well as time consuming design. From this point of view both the oil circulator and the DC generator are superior to the Foucault current disc. As a matter of fact, when this machine was originally planned, the thought of using a DC motor driven as a generator for a brake was stimulated by the greater cheapness and convenience in design rather than any other factor. Appropriate direct current motors may be bought for approximately $100. These motors have ball bearings, are well lubricated, and are thoroughly engineered. No brake that we could design and build for this price in our own shops comes close to them from the point of view of general excellence. Furthermore, to construct, in our shops, a machine having all these features would cost many hundreds of dollars.

Action of the Brake

Since the action of the brake is important in our work, we will devote some space to discussion of the principles which govern it. The wiring diagram for this set-up is given in Figure 2. The motor which we used was a compound motor manufactured by Westinghouse Electric Corp. For our purpose the series winding is ignored. The shunt winding is externally excited with 115 volts DC supplied by a small motor generator. A variable resistor is shunted across the brushes with an ammeter in series. The load is varied by varying the resistance across the brushes.

A detailed calculation of the characteristics of this brake is given in the Appendix A for those who may be interested. It is shown there that if the bearing resistance of the shaft is neglected, the torque is proportional to the current which is read in the ammeter. However, at low torques it is very doubtful that one is justified in neglecting resistance of the bearings.

If one studies the structure of the machine, it will be seen that in addition to carrying the brake, the shaft which is driven by the sample also turns a tachometer generator driven through a gear train. Consequently, the torque at zero brake load is appreciable and some method must be found for taking account of it. At the same time the readings of the ammeter should be translated into pounds or some appropriate measure of mechanical force.

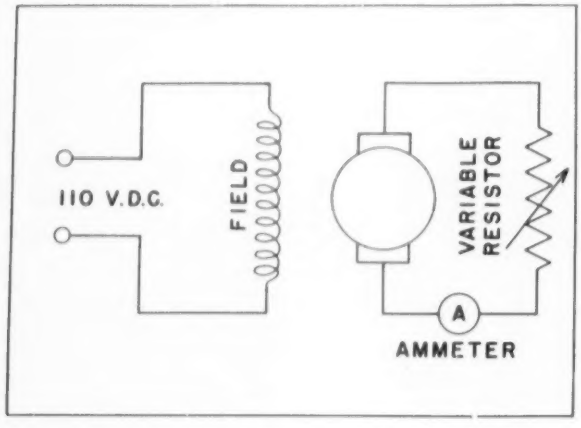


FIG. 2—Wiring diagram for the brake, a DC motor driven as a generator with external field excitation.

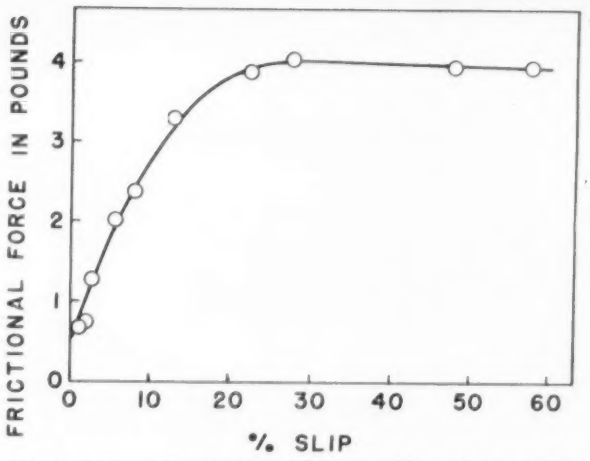


FIG. 3—Frictional force between GR-S type rubber and the grinding wheel as a function of per cent slip.

If we place a polished wheel in place of the grinding wheel and if we use it as the drum in a prony brake, then if we drive the generator as a DC motor (still ignoring the series winding), the current measured in the armature will again be proportional to the torque applied. This torque will include both that portion which is due to the bearing resistance and to the prony brake. The actual torque at a given speed can therefore be obtained by calibrating the motor with prony brakes of varying weights.

As a practical matter, perfectly adequate results can be obtained by driving the system again at zero load and using the current obtained as a measure of bearing resistance. It was found that in any case except at very low torques the bearing resistance is quite small compared to the total force applied. It is apparent, however, that no torque can be measured which is less than the bearing resistance.

Experimental Procedure

The sample is mounted on the apparatus by placing it on the sample wheel shaft and securing it in position with a nut. The counter-weight is adjusted so that the appropriate amount of normal load, usually seven pounds, is placed on the sample. Then, in order to start abrasion, the sample is run for a minute or two before a preliminary weighing on an analytical balance. It is returned to the machine, the resistance of the armature rheostat is adjusted to its minimum, and the readings of the counters are recorded. The sample is then abraded for one minute, during which time the current in the ammeter is allowed to come to a minimum, which is recorded.

After a run is complete, the average amount of slip is calculated from the counter readings, and the sample is

reweighed. This procedure is repeated in successive runs in which resistance of the rheostat is gradually increased, which gradually decreases the torque. Runs are continued until the abrasion loss during one minute is less than one milligram.

Results of the Experiments

If this equipment is used to measure the frictional force as a function of per cent slip, a curve such as the one given in Figure 3 is obtained (in this case for GR-S type rubber). Per cent slip is the ratio of the difference between the surface speed of the sample and the surface speed of the wheel to the surface speed of the sample expressed as a percentage. The general shape of the curve is representative and all rubbers give similar results. It is found that the force is very low or equal to zero at low rates of slip. As the rate of slip increases, the force increases almost linearly up to about 10 per cent slip. Beyond this point the rate of increase is reduced and the force finally reaches a maximum beyond which it decreases slowly.

To understand what is responsible for this behavior, one must consider for a moment what happens on the boundary between a piece of rubber and a rough surface. Imagine for the sake of simplicity a rough surface, as shown in Figure 4, and suppose it is fixed while the rubber moves with respect to it at a constant rate. This is the situation which we would have if a tire were slipping on a dry pavement.

Now, to a first approximation, if the rate of motion is not too rapid, we might expect that the rubber would flow over the surface just as water will flow smoothly around obstacles. It is not our intention to use mathematics to any extent in this paper as the mathematical portion of the theory which is presented will be published elsewhere. However, we can quote from the results. It can be shown that if the flow is stream line, that is if constant lines of flow exist, then the resistance to the motion should be a linear function of the rate of slip. The slope of this linear function should be proportional to the hysteresis of the rubber, and its intercept should be proportional to the coefficient of friction between the rubber and a perfectly smooth surface.

The effect of hysteresis is due to the fact that the

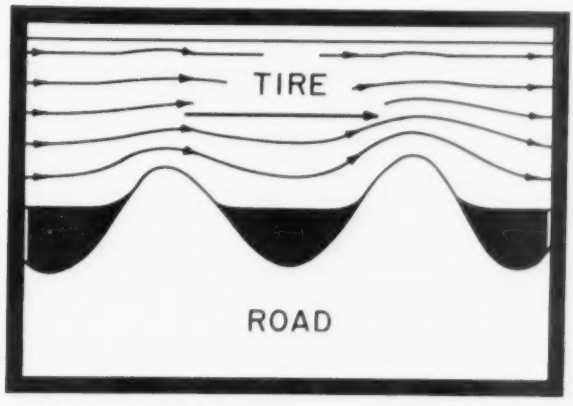


FIG. 4—Schematic of the interface between a tire surface and the road on which it is moving.

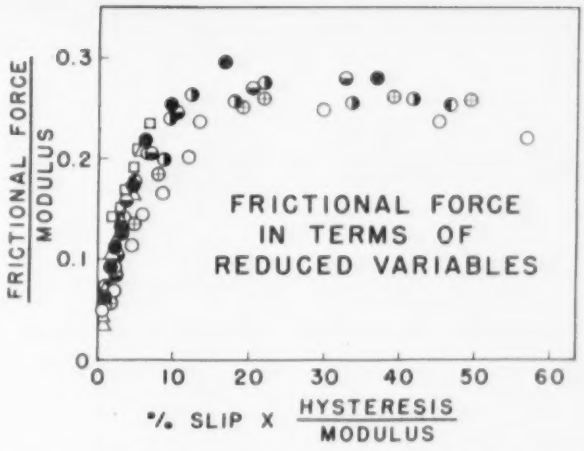


FIG. 5—Frictional force between grinding wheel and various rubbers at different amounts of slip.

rough surface flows through the rubber just as it might through a liquid and the hysteretic force plays the role of a sort of viscosity. The fact that the curve comes close to the origin but does not actually pass through it would seem to indicate that in actual fact the contribution of the friction coefficient is small. The method used to measure both the hysteresis and the modulus was devised by Mooney *(5)*.

Now we can measure the friction coefficient of rubber on a smooth surface by the same technique which we have used here, merely by replacing the grinding wheel with a polished steel wheel described in a previous paragraph. We find in this case that the friction coefficient is appreciable. How do we explain the apparent absence of dry friction coefficient in one case when it seems to be appreciable in the other? The explanation appears to be fairly simple. On a rough surface the actual area of contact is probably quite small. Consequently, the dry friction which takes place is only over a relatively small area, and although it may be appreciable on the area, it is still small compared to the force which is due to the hysteresis.

Further Checks

We have outlined a theory which explains why the friction coefficient of rubber should increase linearly with the slip. However, there are further checks which may be made. If a rubber differing in properties from GR-S type is measured under similar circumstances, it should be possible to show that the slope is indeed proportional to the hysteresis. More generally, it can be shown by scaling the equations of elasticity (see Appendix B) that if we load the sample with a weight which is proportional to its modulus and if we then plot the frictional force divided by the modulus as a function of the slip multiplied by the hysteresis and divided by the modulus, we should obtain a family of curves which are all tangent to the same straight line at the origin.

The reason for loading with a weight proportional to the modulus is that under these conditions the indentation of the sample by the rough surface should be the same in all cases so that the geometry of the surface will be the same; Figure 5 gives such a curve. Although

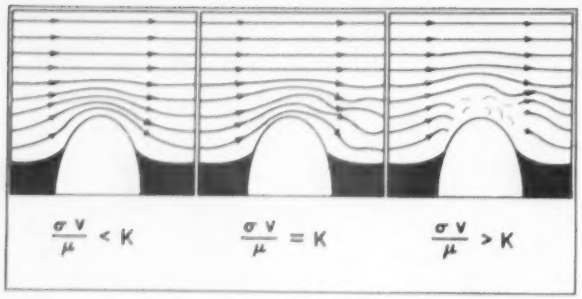


FIG. 6—Pattern of stream lines as $\frac{\sigma v}{\mu}$ passes through the critical value K, creating a rupture in the rubber

there is considerable scatter in the data, they all appear to be tangent to the same straight line at the origin. This result is true despite the fact that we have used such extreme rubbers as gum Hevea, Vulcollan, and loaded GR-S type. However, there is more in the result than we predicted. It is obvious from this data that over the full range of slips, the points all fall on approximately the same line. There is nothing in what we have said previously which explains why this should be the case.

For the sake of discussion this curve may be looked upon as two straight lines, one increasing from zero rather sharply and the other one almost horizontal but slightly decreasing. In the simple theory of elasticity with loss through hysteresis, there is no explanation of the break which occurs in this curve. The theory would predict that the frictional force should increase linearly to a high value with the slip. So far also, although it is perhaps reasonable to suppose that a point would be reached where the force would limit itself, there is no explanation of why the break should take place at the same spot in all rubbers.

Theory of Hydrodynamics

Now there is a certain mathematical as well as physical analogy between the flow of rubber around an obstacle and the flow of a viscous liquid. It is known in the theory of hydrodynamics that it is possible to find for any system a constant of flow known as the Reynolds number. It can be shown mathematically that a similar constant exists in rubber and that the quantity hysteresis times slip divided by modulus, $\frac{\sigma v}{\mu}$, if the shape of the boundary is held constant, plays a part similar to that of the Reynolds number. It is also known that in the case of liquids above a certain Reynolds number, stream line flow ceases to exist, and it ceases to exist for a rather complex reason.

The solutions to the equations of hydrodynamics which predict stream lines are similar for all rates of flow. However, above a certain Reynolds number these stream lines are no longer stable, a slight disturbance of the flow tending to increase indefinitely. The result is that no steady state representable by stream lines can exist, instead there will be a multitude of small oscillations. This phenomenon is known as turbulence.

Now we postulate, and the mathematics seem to bear us out, that in the abrasion of rubber just such an unsteady state develops. What is found is that below a certain value of $\frac{\sigma v}{\mu}$, stream line flow of the rubber over the obstacle as indicated in Figures 4 and 6 is possible. Above this valve, disturbances, the amplitude of which will tend to become extremely large, will take place; but there is a difference between rubber and a liquid. If a liquid is disturbed very greatly no permanent change results, while in rubber a great disturbance will obviously lead to rupture. Consequently, one might expect that turbulence in rubber would ultimately lead to abrasion. When this type of motion sets in, therefore, we would expect a sharp increase in the amount of rubber lost through abrasion.

To check this point we must measure the coefficient of friction and the abrasion simultaneously. Figure 7 gives such a measurement for GR-S type rubber. As can be seen, the rubber loss increases first slightly at low rates of slip, but in the neighborhood of 10 per cent slip the rate of loss increases rather sharply. On the basis of the preceding discussion one would expect the friction force to behave as is shown in the dotted line. It should increase linearly with the slip up to a certain point, and then after a break it should go off in some other direction which the theory does not necessarily determine. Similarly, we would expect that the abrasion would be zero at low slip up to the point where the break occurs, after which the rate of abrasion should increase rapidly.

Except for the rounding off of the curves and a possible slight discrepancy in the positions of the break, this is what was observed. The reason for the rounding of these intersections is probably the following. A sharp break in the curve would occur with a single point of some definite geometry and another point of slightly different shape would give a break at a different spot. The surface of the grinding wheel can be looked upon as a series of points of varying geometrical shape each one giving rise to a rather sharp break at a given speed. Since these breaks would occur at different points that would tend to average out, we would have a region of breaks rather than a single point. Similarly, one point would start removing rubber sooner than another.

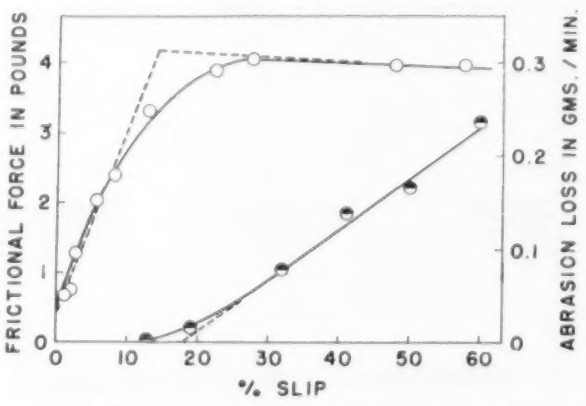


FIG. 7—Frictional and abrasion loss of GR-S type rubber at varying amounts of slip.

There is nothing in this theory which explicitly states how large the particles of rubber which come off are. However, it seems likely that this mechanism is responsible for removing rubber in small pieces. It should be pointed out, however, that this may not be the only way that rubber is lost. If it were so, one would expect that below the break the amount of rubber lost might be very small.

Returning to our previous experiment in which the frictional force on a polished wheel was measured, a very interesting observation can be made. When this experiment was mentioned before, no indication of rubber loss was given, and indeed there was none to speak of. However, the surface of the rubber became tacky. In other words, the rubber is degraded on a smooth surface, and although in our case no loss was observed, a slight dusting of the sample can lead to loss. Furthermore, loss would occur if the rubber had a tendency to stick to the wheel rather than to the sample. At low slip this mechanism may be responsible for abrasion.

Conclusions

We owe many of the rudimentary ideas which we have expressed here to the work of Schalamach *(5, 6, 7, 8, 9)*. The breaks which he observes in the passage of needles over a rubber surface are probably not essentially different from the ones which we discuss. However, his experiments with needles always present the possibility that the needle may not have been sufficiently firmly held in place or that it vibrated slightly. This would complicate the picture. Nonetheless, we feel that his picture of loss is essentially confirmed and elaborated by our work.

Furthermore, the fact that known parameters of the rubber can serve to organize these data would tend to show that the rubber loss in abrasion is essentially a mechanical property at high rates of slip. However, the fact that rubber is degraded on a smooth surface reminds us that at low rates of slip when there is stream line flow, the mechanism of rubber loss is probably quite different. In this case one would expect the degradation to take place to such an extent that the rubber is left on the highway as traces of organic compounds.

It seems probable that both these processes take place and the one that is predominant depends upon the nature of the driver and the highway. When the amount of actual slippage of the tires either through fast driving, sudden braking, or sharp turns is large, then the mechanism of loss of rubber in pieces probably predominates. It is possible, however, that at low rates of slip degradation is a more important factor. The mechanism which predominates should depend on whether $\frac{\alpha v}{\mu}$ is greater than or less than a certain critical value. At the same time since the loss at high rates of slip is very much greater this will have a tendency to dominate the picture.

ACKNOWLEDGMENTS

The authors would like to thank Professor P. J. W. Debye for valuable discussions during the course of this work; Dr. R. H. Snyder of the U. S. Rubber Co. for constant encouragement and help, and the management of the U. S. Rubber Co. for permission to publish.

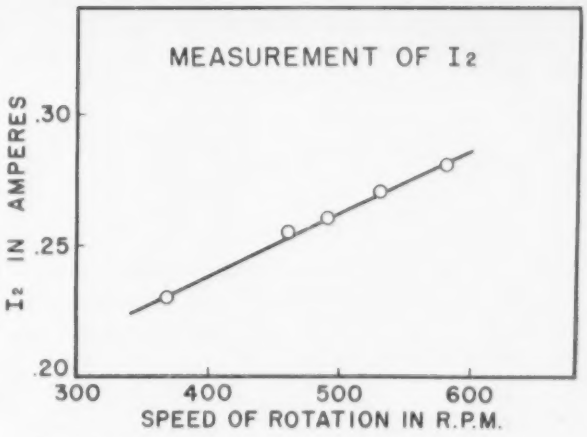


Fig. 8—Calibration curve for measurement of bearing resistance represented by I_2.

LITERATURE REFERENCES

1. L. J. Lambourn, Trans. Inst. Rubber Ind. *4*, 210 (1928).
2. J. W. Adams, J. A. Reynolds, W. E. Messer, and L. H. Howland, Rubber Chem. and Tech. *25*, 191 (1952).
3. L. H. Howland, W. W. White, and E. W. Messer, Rubber Chem. & Tech. *27*, 1977 (1954).
4. R. L. Zapp, Rubber World (N. Y.) *133*, 59 (1955).
5. J. M. Ball and R. L. Randall, Rubber World *130*, 791 (1954).
6. A. Schallamach, Proceedings of Phys. Soc. (London) *65B*, 657 (1952).
7. A. Schallamach, Trans. Inst. Rubber Ind. *28*, 256 (1952).
8. A. Schallamach, Journ. Poly. Sci. *9*, 385 (1952).
9. A. Schallamach, Rubber Chem. & Tech. *28*, 906 (1955).

APPENDIX A

The energy delivered to the brake will be ωT where ω is the angular velocity and T the torque. T will be the difference between the torque due to the sample and the bearing resistance, i.e. $T = T_s - T_b$. (A1)

The EMF generated must be equal to $\alpha\phi\omega$ where α is simple constant and ϕ the field strength. The current generated will be $\frac{\alpha\phi\omega}{R}$ and the energy $\frac{\alpha^2\phi^2\omega^2}{R}$. Equating the energy in both cases eliminating ω, we obtain the relation

$$T_s - T_b = \alpha\phi I \qquad (A2)$$

If we apply a known torque by means of the prony brake and if we drive the generator as a motor we will have

$$T_1 + T_b = \alpha\phi I_1 \qquad (A3)$$

where T_1 is the torque due to the brake. This differs by the fact that the bearing resistance is added. If in addition we drive the motor without force other than the bearing resistance, we will have

$$T_b = \alpha\phi I_2 \qquad (A4)$$

Solving equations 2, 3, and 4 simultaneously we will obtain

$$T_s = T_1\left(\frac{I_1 + I_2}{I_1 - I_2}\right) \qquad (A5)$$

Generally, I_1 and I_2 can be calculated once and for all. If T_1 is chosen fairly large, then I_1 will be large compared to I_2 which can be neglected in the denominator. In the numerator I_2 must be retained only when I is small. The variation of I_2 with speed is not great. It is given in Figure 8.

APPENDIX B

The equations for linear elasticity of an incompressible solid with simple viscous loss are given in B1 and B2

$$\left(\mu + c\frac{\partial}{\partial t}\right)\nabla^2\bar{\xi} = \rho\frac{\partial^2\bar{\xi}}{\partial t^2} \qquad \text{(B1)}$$

$$\text{div}\,\bar{\xi} = 0 \qquad \text{(B2)}$$

where $\bar{\xi}$ is the vector displacement at the point x, y, z and μ, σ and ρ are respectively the modulus, the hysteresis and the density. If the vector $\bar{S}$ is unit normal to a surface then the force on the surface will be

$$\tfrac{1}{2}\left(\mu + \sigma\frac{\partial}{\partial t}\right)[\bar{S}\cdot\nabla\bar{\xi} + \nabla\bar{\xi}\cdot\bar{S}] = \bar{F} \qquad \text{(B3)}$$

If the sample is moving with respect to the abrading surface with a velocity v in a direction specified by the unit vector $\bar{A}$ and if we suppose a steady state established and if ρ/μ can be neglected we obtain

$$\left(1 + \frac{\sigma v}{\mu}\bar{A}\cdot\nabla\right)(\nabla^2\bar{\xi}) = 0 \qquad \text{(B4)}$$

$$\tfrac{1}{2}\left(1 + \frac{\sigma v}{\mu}\bar{A}\cdot\nabla\right)[\bar{S}\cdot\nabla\bar{\xi} + \nabla\bar{\xi}\cdot\bar{S}] = \frac{\bar{F}}{\mu} \qquad \text{(B5)}$$

If we have two samples which are being run in such a way that the geometry is the same and if for both of them $\sigma v/\mu$ is the same, then $\bar{F}/\mu$ must also be the same. In other words, for a given geometry specified by the vectors $\bar{A}$, $\bar{S}$ and $\bar{\xi}$, $\bar{F}/\mu$ must be a linear function of $\sigma v/\mu$. In addition, the component of $\bar{F}$ tangential to the sample must vanish for $v = 0$. It will also vanish as v approaches zero, if the coefficient of friction can be neglected.

(NOTE: Delta sign (δ) is used here as the symbol for partial differentiation.)

GASKETS: Selection and Installation

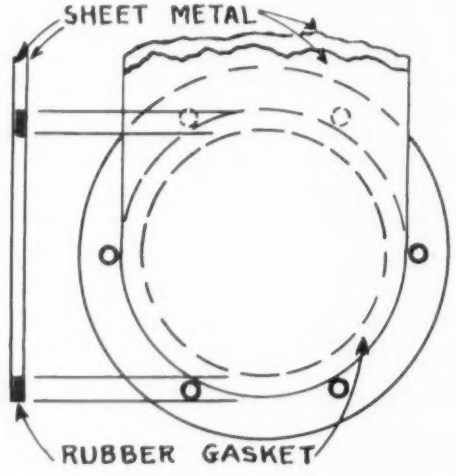
IN the selection of gaskets there are a number of things that must be considered. For instance, to what temperature will the gasket be subjected? Temperature has much to do with proper selection. Thus, if the gasket will not be heated above 240°F., it can be non-metallic. If it will be heated to a range between 240 and 800°F., an asbestos or asbestos covered gasket may serve the purpose. And if the temperatures will run above 800°F., a metal gasket usually gives the best service.

What kind of flange is to be gasketed? That is an important question, as it is the flange that usually determines the type of gasket to use. What is the material? Is it a liquid? Gas? Steam? Is it corrosive? Upon these things depend the kind of gasket material to use. You must not use rubber, for example, if the fluid is gasoline. You must not use copper if the gas is ammonia.

What is the nature of the flange surface? It should be smooth, to facilitate perfect sealing. Perfect contact between the gasket and flange surfaces is essential to assure tightness and prevent leakage. Rough flange surfaces are a liability. The notion that roughness is necessary to prevent gasket slippage is fallacious.

How can one install a thin and flimsy gasket between flanges already in place in a pipe line? The accompanying sketch shows how it has been successfully accomplished on large pipes with thin and flimsy rubber gaskets that were giving much trouble because of folding or buckling.

Let us say, for example, that you have a pipe joint that has been unbolted and the old gasket has been removed. The problem is to install a new gasket in place of the old one and be certain that it has not folded or buckled and that it is in its proper place. Do it in this way: Cut out two pieces of sheet metal as indicated in the sketch, one end being rounded to the exact curvature of the bolt circle, which is the same as the outside curvature of the gasket. Place the gasket between the two pieces of sheet metal as shown in the sectional view, and insert the assembly carefully between the flanges to the position shown in the sketch. Then carefully withdraw one of the pieces of sheet metal, and then the other, leaving the gasket behind in the correct position for bolting.



Before inserting the gasket between the pieces of sheet metal make certain that no surface is "sticky" at any point, so that the position of the gasket will not be disturbed when the pieces of sheet metal are withdrawn.

W.F.S.

PROCEDURE IN OBTAINING PATENTS Part 3

By Kenneth W. Brown

Assisted by Arthur S. Collins and Curt B. Beck

Godfrey L. Cabot, Inc., Boston, Mass.

Value of the Patent

In this part, Appeal of the rejected patent application . . . The divisional application . . . Uses of the patent . . . The infringement suit

IN THE preceding part of this series we discussed the prosecution of an application for a patent on an improved process for the manufacture of high volatile carbon black. The United States Patent Office rejected the application, and refused to issue a patent on the process. In the next stage of prosecution an appeal was filed with the Patent Office Board of Appeals composed of examiners of long experience who are designated "examiners-in-chief." The appeal followed its usual course, that is, a statement of the case and the rejection was filed by the examiner and a brief was filed by counsel for the applicants, followed by oral argument by the counsel.

The Board rendered a decision which was adverse to the applicants. Claims 19 to 27 and 33 and 34 were considered unpatentable over the Damon patent in view of the Aylsworth patent. The Board utilized the reasoning of the examiner in rejecting Claim 19. As to the remaining claims, they found that the art of record did not disclose treatment of carbon black with nitric acid vapors, which method the specification had credited with "superlative results," hence that ground of rejection was not sustained.

The claims through No. 27 were further rejected, however, because surface area limitations of carbon black as stated by claimants could not be supported by anything in the original disclosures, in the Board's opinion. Another claim, No. 35, was rejected because it defined the product in terms of manufacturing process, whereas other claims offered definition without mention of process. In the words of the Board, "It is considered improper to define the product both ways."

These product claims were rejected as unpatentable over Fuchs according to reasons offered by the examiner. The Board concluded that the definitions which did not mention process differed at best "in matters of degree" from products of prior art. Thus the examiner's decision was affirmed.

However, the avenues of appeal had not yet run their course. After the inventors filed, through their counsel, a request for reconsideration, including revisions which removed the questioned limitations from the claims, the Board granted the petition. It is not the Board's policy to consider amendments after a decision has been reached; however, the exception occurred in this instance, the Board explaining that the new amendment brought the phraseology in line with the original specification.

The patent, therefore, was granted with the ten claims, the broadest of which reads: "A process for the production of carbon black having a volatile content in excess of 12%, a moderate surface area and long flow characteristics, which comprises the steps of passing nitric acid vapor through a mass of carbon black in a dry state and removing free nitric acid vapor from the treated black." The key words used by the Board, and on which

Only a few inventions pass unopposed through the Patent Office.

Any new way of doing or constructing something is usually invention.

the question of patentability turned, were that "prior art does not disclose the treatment of carbon black with nitric acid *vapor*."

No more than a relative handful of inventions pass unopposed through the Patent Office. Nearly always there are one or more patents or other publications describing similar procedures or steps of procedures. The art of patent solicitation is in convincing the tribunals of the Patent Office, and sometimes of the courts, that the prior art is not sufficient to inform the man skilled in the art how to reach the invention in question.

It cannot be stressed too often that any new or unfamiliar way of doing or constructing something, or the thing itself, is usually invention, and may be patentable when all or a part can be distinguished from what has been described before. It is only when every element is a duplicate of earlier elements and is combined with the other elements in known, equivalent or obvious fashion that a patent certainly cannot be obtained on such combination. Anything beyond this has at least a chance of being patented.

Continuation-in-Part and Divisional Applications

When additional facts are discovered after a patent application has been filed, it is often desired to broaden the claims to enfold a greater field of invention. If the broader claims lack sufficient basis in the specification—and, of course, new matter cannot be added—then another application including the additional facts must be filed. This is known as a continuation-in-part application and carries the priority date of filing of the original application on all subject matter initially disclosed in the original application.

A divisional application is one split from the original application when more than one invention is claimed. It, of course, carries the same priority date as that of the parent from which it was severed. As many divisional applications as there are inventions are filed. Actually, most divisional situations are concerned with what to most of us is a single invention having several embodiments.

Thus, if it is impossible to claim, or to be allowed to claim, an extensive class of things or chemical compounds generically but several species of such individually are patentable, then as many applications as there are patentable species must be filed. Or a process and an apparatus adapted to carry out the process may constitute separate inventions when the process can be performed in quite different apparatus, or the apparatus may also be used for quite different processes. For example, a carbon black furnace may be operated under conditions of complete combustion to heat a boiler.

The road to many a patent is long and rocky. Its markers may include, in addition to the Office Actions and amendments, affidavits by co-workers or other experts as to the criticality of certain steps or proportions of ingredients, as to the superiority over or difference from certain prior art, inventions, etc. There may also be interviews with examiners—often with the inventor present—to explain why invention was involved. Finally, there is the appeal which is a full dress affair involving briefs by both sides and an oral argument by the proponent of the invention.

The amount of effort expended to obtain any patent is more often than not inversely proportional to the degree of invention involved. But every invention, no matter how slight, should at least be presented for consideration. Many of the most significant and valuable technological advances, the Edison electric lamp, for example, have been founded on invention which represented but a slight departure from the prior art.

The Patent and Its Uses

When the battle is ended, to the relief of both applicant and examiner, the application, now somewhat less robust than at the outset, is ready to issue as a patent. Obvious errors can still be corrected, and some further amendment of claims and even presentation of new claims is permitted if further examination is not required. The patent commences its 17 years of life in due course after payment of the final fee of $30.00, which must be made within six months after the notice of allowance.

The value of the patent is determined by many factors and by each different point of view. For the inventor his patent is a mark of achievement; for the owner the determination of value is much more complex. If the patent covers existing commercial operations, it at least insures their continuance, since no one else can patent the same operation. Additionally, if the patent controls the best practice, it secures to the owner an economic advantage over his competitors, who either must follow a less convenient or less economical course, or pay tribute by way of royalty.

Some patents, of course, issue on inventions which have become obsolete before the date of issue. Most of them, however, at least have a chance of becoming important at some time during their lives. A new invention is concerned largely with the future and only time can tell whether or not it will achieve fame.

Often the existence of a patent stimulates invention in other directions so that, despite obsolescence, it still

Test Your Patent I.Q.

1. The specification of the patent application contains
   (a) a list of all uses of the invention.
   (b) a description of the invention, and the claims.
   (c) the inventor's reasons for wanting a patent.
   (d) a bibliography of pertinent published literature.
2. Each claim of the patent application
   (a) defines exhaustively one particular aspect of the invention.
   (b) consists of no more than one page.
   (c) has no maximum length as long as it covers all aspects of the point in question.
   (d) is but a single sentence.
3. The continuation-in-part application
   (a) carries the priority date of filing of the original application on all subject matter in the original application.
   (b) invalidates the original application.
   (c) has a date decided upon by the patent attorney and the Patent Office.
   (d) often leads to legal difficulties with people who question the filing date.
4. The patent commences its 17-year life after payment of a final fee of
   (a) $12 (b) $30 (c) $50 (d) $75
5. If the Patent Office discovers new art sufficient to invalidate a patent, that patent
   (a) is automatically cancelled.
   (b) is cancelled when the owner has been properly notified by the Patent Office.
   (c) remains until invalidated by court action.
   (d) can never be cancelled, once it has been issued.
6. If an apparatus is not marked with its patent number, the owner
   (a) cannot recover damages from an infringer.
   (b) can recover damages from an infringer.
   (c) can recover damages if he can prove that an infringer knew of the patent.
   (d) cannot recover damages, and cannot prevent an infringer from continuing manufacture of the patented article.

Check your score on page 622.

has served mankind in advancing science. Or, constituting an obstacle to others, the patent gives its owner a trading position in the art to which it relates whereby an advantageous exchange of technology can be made. Even if it does nothing more, a patent publicizes the technological accomplishments of its owner and establishes him as a factor to be reckoned with in the commercial world. Certainly, it never can be said that any patent is worthless, humble though it may be.

Most patents are never litigated. It is usually easier and safer to avoid infringement or to take a license. Sometimes neither is possible, as when infringement is unknown or the patent owner refuses to grant a license at all or at a reasonable royalty. Then comes the costly infringement suit. Instruction in the conduct of infringement suits will not be detailed here. However, a brief summary of what is involved will be interesting and informative, for it is in such a suit that invention is subjected to its greatest ordeal. In litigation no holds are barred and the inventor is put to the acid test to substantiate his invention.

The infringement suit commences with a bill of complaint served on the accused infringer, and filed in the Federal District Court for the district in which he lives or does business. The complaint identifies the patent involved and charges in general terms how the defendent has committed infringement. The defendant then files an answer denying infringement or claiming invalidity of the patent, or both. He may include other defenses such as misuse of the patent by its owner, fraud on the Patent Office in obtaining the patent, unreasonable delay in bringing suit, or any other which would prevent the plaintiff from recovering any damages for the infringement. Both parties then usually file interrogatories, which are written questions to the opposing party covering all aspects of the case.

After that both parties will take the depositions of key witnesses, these depositions being in a sense small scale trials with oral questions and answers recorded by a stenographer. After the preliminary skirmishing, which can be spread over a considerable period of time, even a year or two, the trial of all the issues is held in court before a Federal judge.

After he renders his decision, the losing party may, and often does, appeal to the Circuit Court of Appeals and occasionally from there to the United States Supreme Court. If the plaintiff wins, the case is referred to a master, ordinarily a lawyer, appointed by the court to hear evidence on and to determine damages.

A patent publicizes the technological accomplishments of its owner.

A patent gives its owner an economic advantage over his competitors.

Such is the course of an infringement suit, which is rarely brief. In fact, several years will often pass before the case is concluded, and the cost may be astronomical. Rare is the litigation in which the combined expenses of the parties will be less than about $20,000 and costs in the six figure range are quite common. Hence, settlement of a dispute over infringement is always to be preferred if it is possible.

Value of the Patent in Litigation

From the standpoint of litigation the value of a patent to its owner may be two-fold. The existence of a patent may save him from inadvertently committing infringement by barring the patenting of the same subject matter by others. Also, the value of a patent almost always will be greater than its theoretical worth because a prospective infringer will normally prefer to pay a royalty than to incur the expense of a suit.

The issuance of the patent is not always the end of its prosecution. Under appropriate circumstances its claims may be enlarged or reduced in scope by the way of reissue or disclaimer. Thus, if within one year after the patent issues the inventor discovers that he has inadvertently and by mistake failed to claim his invention as fully as he was entitled on the basis of the original disclosure, he can file an application for the reissue of the old patent. In such case the complete application is refiled with claims modified as desired. The same filing fee of $30.00 is required and the application is fully re-examined as to novelty and, additionally, as to the genuineness of the inadvertence or mistake.

Sometimes the examiner may dig up new art which is sufficient to invalidate the original patent. However, there is no procedure for revoking or cancelling issued patents, so there it remains until invalidated by court action. If the reissue application is allowed, it is specially numbered in the reissue series, but its life is no longer than that remaining for the original patent.

A disclaimer also affects an issued patent, but only to narrow, not increase, its scope. Thus when a court deems or patent owner believes a certain number of the claims of a patent to be too broad, they may be disclaimed by the owner, leaving the remaining claims in full force and effect. Disclaimers may also be applied to portions of a claim but not if the cancelled matter will broaden the claim by eliminating restrictive language.

Other than to check the effect of the disclaimer on the remaining claims, there is no further examination of the patent. So a disclaimer functions as an amputation to prevent spread of infection to the rest of the patent. Failure to disclaim after a court decision as to invalidity of such specified claims results in eventual invalidation of the entire patent.

Marking with the Patent Number

The owner of an apparatus patent has an added obligation, which is to mark all such apparatus manufactured or sold by him or under license from him with the patent number. If someone infringes the patent before being notified of the infringement by the owner, the latter cannot recover damages where the apparatus has not been marked. This is so even if the infringer knows not only of the patent but also that he is infringing it. Naturally a process cannot be marked, but if the owner sells apparatus in which the process can be carried out, appropriate marking is advisable.

The following words of caution should be carefully heeded. The existence of a patent does not necessarily guarantee that the doing of everything described therein will not infringe any other patent. In fact, it may be that the invention claimed in the patent cannot be practiced without infringing some other patent. The situation in which a narrow specie claim is dominated by broad generic claims of another patent, or in which neither of two patented inventions can be practiced without infringing the other, is by no means unusual. However, the acquisition of a patent will prevent the later inventor from covering the same subject matter.

Even though a patent may never issue on an application because of overwhelming prior art, the effort exerted in preparing and filing the application is usually not wasted. By prosecuting the application through an appeal an extensive record is accumulated to demonstrate effectively that patentable invention does not exist and can never be patented validly by later workers in the field. From the defensive standpoint, such a record may be almost as valuable as a patent to the owner of the invention.

Answers to Patent I.Q. Test

1. (b) a description of the invention, and the claims.
2. (d) is but a single sentence.
3. (a) carries the priority date of filing of the original application on all subject matter in the original application.
4. (b) $30.
5. (c) remains until invalidated by court action.
6. (a) cannot recover damages from an infringer.

A report on the June meeting of the Southern Rubber Group

Antioxidants and Antiozonants

Arresting the deterioration of rubber by oxygen and ozone was the subject of one panel; here is what the experts had to say

THE Southern Rubber Group featured two technical panel discussions at its meeting at the Dinkler Plaza Hotel in Atlanta, Ga. on June 7 and 8. The first, which was on "Latex," was moderated by J. L. Fesperman (Catherine Rug Mills). The speakers and their topics were: E. Glymph (Firestone), "Natural Latex;" J. P. McKenzie (Copolymer Rubber & Chemical), "Styrene-Butadiene (GR-S Type) Latex;" R. R. Waterman (R. T. Vanderbilt), "Latex Compounding," and E. Leonard Borg (Naugatuck Chemical), "Uses of Latex in Textiles, Fibres and Paper."

The other panel, which was on "Antioxidants and Antiozonants," was moderated by Alfred E. Hoffman (Universal Oil Products). The speakers and their topics were: T. H. Newby (Naugatuck Chemical), "Industrial Growth and Theory of Function;" D. E. Baker (Monsanto Chemical), "Uses in Tires and Tubes;" J. C. Stewart and R. R. Waterman (R. T. Vanderbilt), "Use in Latex," (the paper was delivered by Mr. Stewart); A. R. Davis (American Cyanamid), "Use in Molded and Extruded Goods," and C. E. McCormack (DuPont), "Use in Wire and Cable."

Some 250 members attended the meeting, which was under the direction of Thomas R. Brown (Goodrich), who acted as program chairman. He was assisted by Warren Hall (Phillips Chemical) and W. J. Mohr (Southern Latex). The papers presented at the meeting of the panel on antioxidants follow.

Industrial Growth and Theory of Function

By T. H. NEWBY

Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn.

THE first case of recognition of antioxidant power in a chemical seems to have occurred as early as 1797 when it was recognized that traces of sulfur prevent the oxyluminescence of phosphorus in air. The record of who was the first to conceive the idea of using antioxidants in rubber is not clear. Probably no one man can claim full credit for the idea. However, in 1870 a man named Murphy recognized that rubber deteriorates from oxidation and suggested the use of phenols to retard this decay.

Prior to 1900 paraffin and organic and inorganic reducing agents were also suggested as antioxidants but no commercial action seems to have been taken on any of these patents. By 1921 sufficient classes of chemicals had been suggested as antioxidants for the Frenchman DuFraisse to start writing review articles on the subject.

Probably the first commercial attempt to arrest the deterioration of rubber was made in 1906 when the Diamond Rubber Co. used organic accelvators discovered by Oenslager to make better-aging tires than theretofore possible.

About 1918 an intensive study of the use of synthetic substances to prevent the deterioration of rubber was begun on an industry-wide scale, culminating in the commercial use of an aldehyde-amine reaction product, V-G-B, in the middle 1920's. This was the first instance of the commercial use of a synthetic organic substance to prevent the deterioration of rubber. From this start the antioxidant industry grew rapidly, hundreds of patents being issued in the next thirty years on aromatic amines, phenols and miscellaneous substances as antioxidants. By 1941 the antioxidant business had grown from essentially nothing in 1949 to a healthy 20.5 million pounds.

The advent of GR-S in the early 1940's accompanied by the use of BLE, PBNA and EFED as stabilizers resulted in an increase in antioxidant pounds to 36.7

million in 1946. Continued growth in rubber hydrocarbon usage and increased realization of the need for antiozonant protection in the early 1950's have resulted in an increase in the rubber antioxidant business to 67.2 million pounds in 1955, the last year for which firm figures are available.

A significant factor in the growth of the rubber antioxidant industry has been the development of accelerated tests for measuring the benefit gained by using protective agents. Tests and equipment developed by men such as Geer, Bierer, Davis and DeMattia have done much to speed the growth rate of the market for antioxidants.

Theory of Function of Antioxidants

In order to understand how antioxidants function it is necessary to understand the mechanism of deterioration of rubber, so let this be our first problem. In order to delineate the mechanism of deterioration of rubber we must first establish what agent or agents are causing this deterioration. To make a very long story short, it can unequivocally be said that two culprits are at the bottom of our trouble—oxygen and ozone. To be sure many other factors such as heat, oxidation catalysts, fatigue, light, weathering and atomic radiation increase the rate and extent of the deterioration. But basically it is a fact: no oxygen or ozone—no great deterioration of rubber. It must also be realized that the mechanism of deterioration by oxygen is different from that by ozone. Let us first examine the oxidation mechanism.

There have been many different attempts to explain this phenomenon, however, in recent years the thinking has pretty well settled on one mechanism. The oxidation of rubber is viewed as a free radical, autocatalytic chain reaction, written as follows:

$$
\begin{aligned}
RH + \gamma &\longrightarrow R\cdot + H\cdot \\
R\cdot + O_2 &\longrightarrow ROO\cdot \\
ROO\cdot + RH &\longrightarrow ROOH + R\cdot \\
ROOH &\longrightarrow RO\cdot + OH\cdot \\
RO\cdot + RH &\longrightarrow ROH + R\cdot \\
\cdot OH + RH &\longrightarrow H_2O + R\cdot
\end{aligned}
$$

Thus the original rubber free radical has generated three new free radicals (autocatalysis) and set off a chain reaction which if unchecked will result in either chain scission to a soup or cross-linking to a boardy stock.

$$
\begin{aligned}
R\cdot &\longrightarrow 2R'H \\
ROO\cdot &\longrightarrow R'C(=O)H + R'OH
\end{aligned}
$$

chain scission

$$
\begin{aligned}
2R\cdot &\longrightarrow RR \\
ROO\cdot + R\cdot &\longrightarrow ROOR
\end{aligned}
$$

cross-linking

In any given polymer both of these reactions occur. Whether the polymer softens or hardens is dependent on many factors which will not be discussed here.

In order to protect the rubber it is necessary to stop the chain reaction and to destroy any peroxides already present. The mechanism for this can be written as follows:

$$
\begin{aligned}
R\cdot + AH &\longrightarrow RH + A\cdot \\
ROO\cdot + AH &\longrightarrow ROOH + A\cdot \\
RO\cdot + AH &\longrightarrow ROH + A\cdot \\
ROOH + AH &\longrightarrow \text{harmless products}
\end{aligned}
$$

The free radical A· is incapable of propagating the chain reaction because of its low activation energy. The antioxidant itself is gradually consumed in protecting the rubber.

This mechanism explains why very small amounts of antioxidant, as low as .001 per cent, are able to protect rubber for long periods of time. It is only necessary to interrupt the chain reaction at the beginning in order to hold down deterioration. It has been established that amine antioxidants are capable of both killing free radicals and decomposing peroxides. Phenols on the other hand act almost solely by killing free radicals.

The mechanism of rubber deterioration by ozone is not as well proven as that by oxygen. The latest thinking is as follows:

1. $RC(R')H-CR + O_3 \longrightarrow R-C(R')-CR$ (−)O–O–O (+) or $RC(R')-CR$ O–O–O

OZONIDES

2. $RC(R')H-CR$ (−)O–O–O (+) $\xrightarrow[\text{Decompsition}]{\text{Spontaneous}} RC(R')-OO^{(-)} + RC(=O)-H$ (+)

3. $RC(R')-OO^{(-)}$ (+) $\longrightarrow \tfrac{1}{2}$ R′–O–O–C(R′)(O)–C(R′)(O)–O–O–R′

PEROXIDE

4. $RC(R')-OO^{(-)}$ (+) $+ RC(=O)H \longrightarrow$ R′–O–O–C(R′)(H)–C(R′)(O)–O–R′

ISO-OZONIDE

The peroxides or iso-ozonides formed are not stable and will upon hydrolysis or other types of decomposition give chain scission.

The protection of rubber from deterioration by ozone is then a matter of either:

(a) preventing the initial formation of the ozonide, or
(b) preventing the decomposition of the ozonide into fragments.

The question as to which of these two mechanisms is the correct one remains yet to be answered. Various fragmentary parts of the puzzle are available however. At the moment, from work done at Naugatuck Chemical, it appears that mechanism (b) is more likely. It is hoped that the complete answer to this problem will be made clear within the next few years.

Use of Antioxidants and Antiozonants in Tires and Tubes

By D. E. BAKER

Monsanto Chemical Co., Akron, Ohio

THE almost phenomenal advance of the automobile in the early part of the present century put an unprecedented demand on the rubber industry for a tire and other rubber parts that would retain their original properties to a far greater extent than had been heretofore possible. If progress were to continue in the rubber industry there would have to be some drastic improvements made in the service life of rubber articles. This led to the discovery of organic materials known as "antioxidants."

The first antioxidant to be offered commercially was a reaction product of aniline and acetaldehyde known as V-G-B. This material was introduced in 1924. Since that time many thousands of organic materials have been synthetized and tested for the purpose of an antioxidant. The result of this tremendous effort is apparent in the number of excellent antioxidants available to the rubber technician today. The current list of antioxidants available affords the rubber technician a choice of materials from which he is able to get specific end results in most rubber compounds.

Cracking by Atmospheric Ozone

The use of our present day antioxidants gives rubber products which withstand oxidation, heat, and flexing very well; but the picture began to cloud about twenty years ago when rather widespread failure occurred in many rubber articles even though they were protected with the best antioxidants available. The ozone present in the atmosphere was attacking the rubber and causing it to crack badly.

Certain sections of the country seemed to be much worse than others for this type of failure, and it was found that the concentration of ozone in the atmosphere varied widely as to locality and from day to day. Probably the most publicized locality for high ozone concentration is the Los Angeles area. However, there are other localities, such as Denver and Litchfield Park, that have shown very high ozone concentrations at times. Certain small areas may also be high in ozone due to the geography and/or industry of the locality. The deleterious effect of ozone on rubber became a problem of alarming proportions when tires and rubber sundries were cut to ribbons in a few days in some localities.

This condition brought about new research which resulted in the discovery of new organic compounds that would resist the ravages of ozone on vulcanized rubber. These compounds are known as "antiozonants". They have certain antioxidant values but are primarily protectors of vulcanized rubber when subjected to an ozone bearing atmosphere. The first commercially available antiozonant was "Santoflex AW" and the year was 1950.

Now that we have discussed the events and conditions that prompted the producing of the many organic compounds known today as antioxidants and antiozonants, let us discuss the application of these compounds to the production of the present day tire and tube. Currently the following list of antioxidants are generally used alone or in combination at the discretion of the compounder for treads and black sidewalls:

BLE	Neozone D
Santoflex DD	Agerite Powder
Santoflex 75	Stabilite
Flexamine	Akroflex C
Thermoflex A	

It should be mentioned here that certain antioxidants (Santoflex 75, Flexamine, Thermoflex A and Akroflex C) will bloom if used above certain percentages. These are the ones containing diphenyl-P-phenylene diamine. It is generally found that .35% of this material is the limit for a non-bloom stock. It is therefore necessary to use not more of these particular antioxidants than will carry .35% diphenyl-P-phenylene diamine on the rubber content.

In addition to the foregoing materials we may list for use in innertubes where excellent heat resistance is desired the following:

Flectol H
Agerite Resin D

The available antiozonants are few in number compared to available antioxidants. About the only ones available at this time are:

Santoflex AW	Bayer 4010
OZO 88	Tenamene 11
UOP 88	Tenamene 30-31

These may also be used alone or in combination with others. They may also be used in combination with antioxidants where needed.

Present Day Tire and Tube Compounds

Present day tire and tube compounds can be divided primarily into three groups—passenger, truck and farm implement. Each group usually has a different compound and offers different problems.

Most of the passenger tires of today are tubeless, but there are, of course, a fairly large number of replacement tires of the tube type. The carcass stock of passenger tires is largely synthetic rubber which has an antioxidant stabilizer added to the rubber before coagulation. While this original antioxidant may be sufficient for most antioxidant requirements as such, it may not be sufficient to prevent the polymer from becoming too tough to process properly, so that additional antioxidant may be desirable.

Passenger tread stocks are also usually made with synthetic rubber, so here again an increment of antioxidant may be beneficial from the processing angle, but in addition there should be a good antioxidant added to provide improved flexing qualities. In some cases an antiozonant is used in a passenger tread if the tire is to be used in an area of extremely high ozone concentra-

tion, but usually only the black sidewall will be protected with such a material. The amount ordinarily used is from 1 to 2% on the rubber content of the compound.

The white wall of a tire cannot be protected from ozone by the use of the present antiozonants since they stain and discolor badly. The use of a small dosage of a good wax is in order for a white wall stock. Some white walls are combinations of neoprene and natural rubber which affords good protection from the effects of ozone.

Passenger tube stocks usually contain from .5 to 2% of a good heat resistant type antioxidant if made from natural rubber, but if they are butyl rubber tubes, they will probably require no added antioxidant.

Truck tires may be largely natural rubber, depending to some extent on the size of the tire. This type tire requires more antioxidant because of the high temperature of operation and heavy load requirements. Good flexing properties are very important in truck treads. Antioxidant levels are from 1 to 4% on many of these stocks. The side walls will usually be protected with from 1 to 5% of an antiozonant as required. This may be in addition to the regular level of antioxidant in some cases.

Truck tubes are subjected to very high heat conditions and should be protected as well as possible against heat deterioration. If the tube is a natural rubber tube a level of 1.5 to 2.5% of a good heat resistant antioxidant is advisable. However, if the tube is butyl rubber, then there is not too great a need for additional antioxidant, and if any is used, it would be about 1%.

Truck tire flaps are also subjected to very high heat conditions and must be protected similarly to tube stocks, but in addition these flaps are subjected to ozone in certain areas. It is therefore necessary to use an antiozonant in some truck flaps. The percentage of antiozonant may run as high as 3 or 4% along with 1 to 3% of a suitable wax in certain flaps.

Farm implement tires present a different problem than those experienced in over-the-road type tires. Implement tires are required to have excellent weathering resistance and, therefore, should be protected with larger dosages of a suitable wax and antiozonant. In some cases the wax and antiozonant content are at the 3 to 4% level for each material.

Time does not permit a detailed discussion of the various problems that may confront the compounder, but this general coverage should provide leads to solving the most common problems in tire and tube compounding. The recommendation of specific antioxidants and antiozonants has been disregarded because of varying conditions and the compounder's choice. Each compounder can choose the proper material to meet his needs for any particular compound.

Use of Antioxidants and Antiozonants in Latex

By J. C. STEWART and R. R. WATERMAN

R. T. Vanderbilt Co., Inc., New York, N. Y.

MANY new uses for latex are developing each year. The use of latex rug backing and upholstery backing compounds has increased considerably in recent years. Latex coatings on knit fabrics impart dimensional stability, and "man made" fur coats result. These products require antioxidants to retard polymer degradation in order that the service life be adequate.

The needs for antioxidant protection in latex rubber are intensified because of the large surface area per unit weight. The high tensile strength of latex permits the use of thin films. The thinner the film, the greater the surface area per unit weight.

For example, latex foam is composed of interconnecting cells which have thin walls. Foam is a comfortable cushioning material because air circulates through the interconnecting cells with each flexure. This movement of air, coupled with large surface area exposed per unit weight, necessitates adequate antioxidant protection. In surgical stockings the extruded latex thread has a large surface area per pound. The need for antioxidant protection is increased as the surface area is increased.

The choice of antioxidants is limited by personal use. Many latex articles are used either in close proximity or in direct contact with one's person. This personal use prohibits the use of toxic or malodorous materials. For aesthetic reasons most latex articles are produced in light shades of color so that the use of discoloring antioxidants is limited. Migration staining and sunlight discoloration should be at a minimum in fabric coating that is laundered and then hung on a line to dry.

The use of latex compounds in conjunction with fibers and fabrics is steadily increasing. For economic reasons the latex compound is applied to the fiber or fabric prior to finishing. The use of copper salts in the finishing operation may limit the choice of antioxidants. The use of products of combustion in gas heated driers, both industrial and domestic, increases the oxides of nitrogen; this increase accelerates the aging.

Perhaps a definition of an antioxidant and a brief discussion of types of polymer degradation as applied to latex products is desirable. An antioxidant may be defined as a material which when used in small amounts, helps to maintain the original properties of the vulcanized elastomer during service or storage.

Types of Polymer Degradation

Polymer degradation by oxygen and by the oxides of nitrogen causes natural rubber to soften; SBR, neoprene, and nitrile to stiffen. Softening is predominantly cutting of the elastomer chain or chain scission. Stiffening is cross-linking of the elastomer chain and is similar to vulcanization. Oxidation may also bring about alteration in the side chains.

Chain scission causes the tensile to drop very rapidly, and the surface becomes soft and sticky. Stickiness is especially objectionable in fabric coatings. Cross-linking

causes stiffening, embrittlement, and loss of elastomeric properties, and will alter the feel of latex coated fabrics. Alterations in the side chains may alter solubility. A change in solubility effects the dry cleaning resistance of "solvent resistant" type coatings.

In general, the three reactions occur simultaneously. The nature of the polymer and the temperature, together with oxygen concentration, will determine whether chain scission, cross-linkage, or side chain alteration predominates.

Oxygen degradation is autocatalytic. Exposure to light tends to speed up the reaction. The fatty acid salts of copper, cobalt, manganese, and iron also catalyze the reaction.

Fatty acid soaps are used as emulsifiers for synthetic latex production. Fatty acid soaps are frequently used as compound stabilizers. Because of this, the use of antioxidants which inhibit metal poisoning is indicated.

Antioxidants protect the polymer by interfering with the free radical chain reaction of oxidation. The antioxidant is consumed in the process of protection. It is therefore desirable to have the antioxidant level high to afford the needed protection. Natural latex, as drawn from the tree, contains antioxidants. Concentration procedures tend to reduce the antioxidant materials originally present. Synthetic latices usually contain antioxidant. Experience indicates that additional antioxidant protection is required and should be added during compounding.

Transparent stocks are very difficult to protect against oxidation because of radiation. The inclusion of titanium dioxide or other opacifying material aids the antioxidant. Exposure of coatings to infrared heat may place an added burden on the antioxidant unless the process is carefully controlled.

The Ideal Latex Antioxidant

Perhaps a specification for the ideal latex antioxidant will be of interest.

(1) The material should be water insoluble but readily dispersed or emulsified in water. The dispersion or emulsion should be stable in storage.

(2) The dispersion or emulsion should not alter the chemical or mechanical stability of the compound.

(3) It should not discolor or stain.

(4) It should be non-toxic and odor free.

(5) It should not alter curing characteristics of the film.

(6) It should not bloom.

(7) It should inhibit poisoning ("copper poisoning").

Effective antiozonants, as such, are still in the development stage. Certain of the amine-type antioxidants, when present in amounts considerably greater than normal dosage, afford some degree of protection. However, in static service an unbroken film of a saturated material is effective. Certain waxes, resins, and oils are frequently used. Some elastomers are inherently resistant. Neoprene is not readily attacked by ozone.

To summarize, the antioxidant should be present in sufficient quantity to afford protection against the deteriorating effects which will be encountered during processing, storage, and service. Ozone degradation is most serious when the rubber film is under tension. Fortunately, most latex applications in the textile field are not stretched to a critical value while in use.

Use of Antioxidants and Antiozonants in Molded and Extruded Goods

By A. R. DAVIS

American Cyanamid Co., Stamford, Conn.

BEFORE discussing antioxidants and antiozonants as used in molded and extruded goods, it seems desirable to have some definitions for the terms of this subject. Antioxidants *(6)* are substances which, when added to rubber in small proportions, retard atmospheric oxidation or the effects of oxidation of rubber. Antiozonants *(1)* are substances which retard or prevent the appearance of cracks in rubber from the action of ozone when the rubber is exposed under tension, either statically or dynamically, to air containing ozone.

The molded and extruded goods, for which antioxidants and antiozonants are to be discussed, fall into classifications as follows:

(1) Mechanical goods
  - (a) General purpose
  - (b) Specification including government and armed services
  - (c) Automotive

(2) Heels and soles

(3) Specialties and drug sundries

Molded and extruded goods in these classifications may be based on a number of different elastomers. In other words, they are made from natural rubber or one or more of the synthetic elastomers which have become increasingly available in the last 15 to 25 years.

The products based on the nearly saturated or saturated polymers such as butyl rubber, Hypalon, the Thiokols and silicone rubbers are very resistant to the action of oxygen and ozone. Accordingly, the molded and extruded goods made from these polymers do not usually require the use of antioxidants and antiozonants. The best ozone resistant butyl rubber products are obtained by using a polymer with low unsaturation, such as butyl rubber 035 along with a high state of cure and about 3% of stearic acid or 5% of paraffin wax.

Although the molded and extruded goods made from neoprene are decidedly more resistant to oxygen and ozone than those made from natural rubber, butadiene-styrene (SBR) and butadiene-acrylonitrile copolymers, the best results are obtained by the use of good antioxidants and other protective materials.

For good aging of dark colored neoprene products, 1 to 2% of phenyl-β-naphthylamine is often used. The ozone resistance of such products for both static and

dynamic applications may be improved by increasing the phenyl-β-naphthylamine ratio to 3 to 5%. For static applications, 2 to 5% of a blended microcrystalline wax is beneficial to the ozone resistance of neoprene products. Good aging white or light colored neoprene products can be obtained by the use of some of the better non-discoloring antioxidants used in natural rubber.

Although, the butadiene-styrene and butadiene-acrylonitrile (nitrile rubbers) copolymers as manufactured contain an antioxidant or stabilizer, many molded and extruded goods made from these elastomers carry additional amounts of antioxidants. Fortunately, the same antioxidants used in natural rubber give good results in these synthetic elastomers.

The choice of antioxidants for molded and extruded goods made from natural rubber or the synthetic diene polymers and copolymers depends, of course, on the service requirements of the product and the properties of the antioxidant. There are approximately 50 different antioxidants available which are used to varying extents in molded and extruded products. Most of these antioxidants may be grouped in the five important classes shown below.

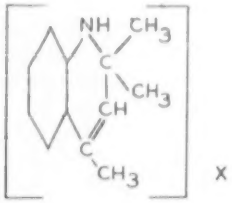
Aldehydeamines
Ketone-amine reaction products
Secondary amines
  (a) Secondary aromatic amines
  (b) Secondary alkyl-aryl amines
Primary aromatic amines
Phenols

Common Commercial Antioxidants

Aldehydeamines. This class of antioxidants may be illustrated by Aldol-α-naphthylamine (AgeRite Resin*) whose use was patented in 1924 and which started the large scale use of antioxidants in the United States. Aldol-α-naphthylamine gives protection against oxidation and heat deterioration, and may be used in dark colored stocks in the ratios of 1 to 5% on the polymer.

Other aldehydeamines are: Acetaldehyde-aniline reaction product (VGB*) and Butyraldehyde-aniline reaction product (Antox*).

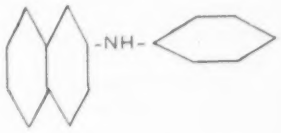
Ketone-amine reaction products. Two examples will suffice to illustrate the Ketone-amine antioxidants: Acetone-aniline reaction product (AgeRite Resin D*) equals Polytrimethyl dihydroquinoline. Its formula is



This resinous material is used in ratios of 1 to 2% and up to 5% for heat resistance in dark colored products.

Acetone-diphenylamine reaction products, (B-L-E* and B-L-E-25*), are liquid products commonly used in ratios of 1 to 1.5%/RHC for protection against oxygen and heat in dark colored items.

Secondary amines. An outstanding example of secondary aromatic amines is Phenyl-β-naphthylamine (AgeRite Powder* and Neozone D*). The formula is



This grey colored powder is a general purpose antioxidant and is commonly used in ratios of 1.0 to 1.5% on the rubber hydrocarbon in dark colored rubber products.

The secondary amines known as alkylated diphenylamines are good antioxidants which give less discoloration and staining than most good amine-type antioxidants. They are also classified as semi-discoloring antioxidants. Examples are: AgeRite Stalite* (Octylated diphenylamine) and Octamine* (Diisobutylene-diphenylamine reaction product). Since these are likely to be mixtures of the mono- and dialkyl diphenylamines structural formulas are not usually shown. These alkylated diphenylamines are used in ratios of 1 to 2% on the rubber in many molded and extruded goods where a small amount of discoloration can be tolerated.

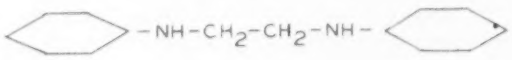
An interesting secondary aromatic amine is Diphenyl-p-phenylene diamine. The formula is

Due to its limited solubility in rubber, diphenyl-p-phenylenediamine is not used as an antioxidant by itself. However, it is used in blends with phenyl-β-naphthylamine or ketone-amine reaction products to give antioxidants which offer improved resistance to flexing of dark colored goods.

Another interesting secondary aromatic amine is Di-beta-naphthyl-p-phenylene diamine (AgeRite White*). Its formula is

This light gray colored powder gives protection against normal oxidation and that induced by copper and heat. It is used in ratios of 0.25 to 2.0% on the rubber. In white stocks it gives a gray discoloration on exposure to light.

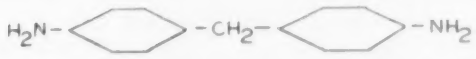
Secondary alkyl-aryl amines are illustrated by N,N'-diphenylethylene diamine (Stabilite*). Its formula is



* Trademark.

This is a general purpose antioxidant which is used in ratios of about 1.0 to 1.5% on the rubber. It tends to give some discoloration on exposure to light so that it cannot be used in the best white stocks.

Primary aromatic amines. The primary aromatic amines in general are not very effective antioxidants so that they have somewhat limited use. p, p'-Diaminodiphenylmethane (Tonox*) is a good example of this class. Its formula is



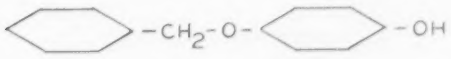
This brown waxy material has an activating effect on the cure. However, it is used in ratios of about 0.25 to 0.375% on the rubber to inhibit frosting during warm, humid weather and to improve the abrasion resistance of butadiene-styrene copolymer heels. It gives considerable discoloration on exposure to light, so that it cannot be used in the best white or light colored goods.

Phenols. Since 1870 when phenol and cresol, which have little or no antioxidant value, were mentioned in an early phenol patent, a large number of phenolic type chemicals have been tried as antioxidants. In the last ten years a number of new phenolic type chemicals have come into use as antioxidants. The phenolic type chemicals give less discoloration than the other classes of antioxidants.

The best non-discoloring and non-staining antioxidants are phenols. Some give practically no discoloration on exposure to light and other aging conditions, while others show only a very moderate amount of discoloration even in the best white rubber products. The phenols show varying degrees of antioxidant activity from slight to very good.

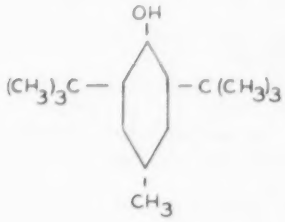
White and light colored molded and extruded goods requiring good aging qualities and a minimum of discoloration may be made with one of the many non-discoloring phenolic type antioxidants now available. Typical phenolic type antioxidants are the following:

Monobenzyl ether of hydroquinone (AgeRite Alba*). Its formula is



This tan colored powder is used in ratios of 0.25 to 1.0% on the rubber and gives protection against oxidation, flexing and frosting, with a small amount of discoloration on exposure to sunlight.

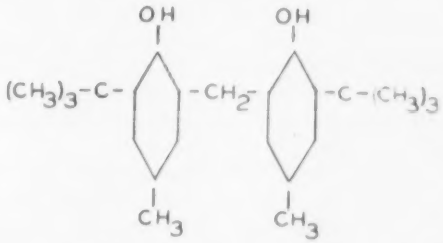
2,6-Ditertiarybutyl-4-methylphenol (DBPC*, Ionol,* Deenax*). The formula is



This hindered phenol in ratios of 1 to 2% on the rubber gives mild protection against oxidation with practically no discoloration in white items on exposure to light.

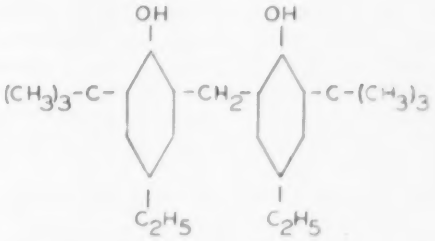
Styrene-phenol reaction products (AgeRite Spar*, Styphen I*, WingStay-S*). These liquid products are reaction mixtures and a simple structural formula cannot be given. In ratios of 1 to 2% on the rubber these materials give mild protection against oxidation with practically no discoloration in the best white products on exposure to sunlight.

2,2'-Methylenebis (4-methyl-6-teritiarybutylphenol) (Antioxidant 2246*). The formula is



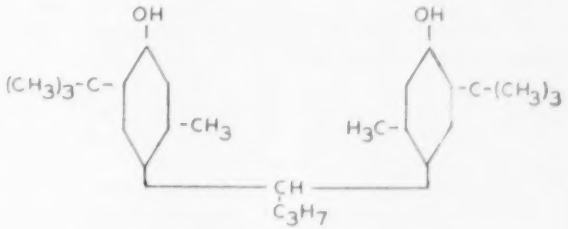
In ratios of 0.25 to 2.0% on the rubber hydrocarbon (RHC) this chemical gives very good protection against oxidation, is beneficial against flexing and surface oxidation induced by light, while giving a slight amount of discoloration in white rubber products on exposure to light.

2,2-Methylenebis (4-ethyl-6-tertiarybutylphenol) (Antioxidant 425*). The formula is



This chemical in ratios of 0.25 to 2.0% on the rubber gives very good protection against oxidation with practically no discoloration in white goods on exposure to light.

4,4'-Butylidenebis (3-methyl-6-teritiarybutylphenol) (Santowhite Powder*). Its formula is



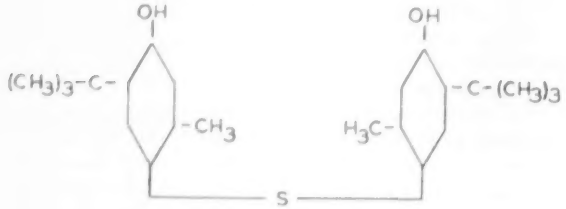
This antioxidant in ratios of about 1 to 2% on the RHC

* Trademark.

* Trademark.

gives very good protection against oxidation with very slight discoloration in white products on exposure to light.

4,4′-Thiobis (3-methyl-6-tertiarybutylphenol) (Santowhite Crystals*). The formula is



In ratios of about 1 to 2% on the rubber this antioxidant gives very good protection against oxidation with only a small amount of discoloration in white goods on exposure to sunlight.

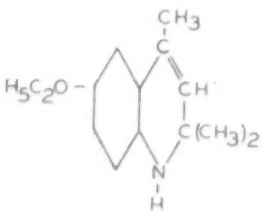
For many years it has been generally known that ozone *(2, 3, 4, 5, 11)* causes the cracking of molded and extruded goods exposed under tension, either in static or dynamic service. The attack of ozone on rubber products is a direct consequence of the unsaturation of the polymers. In general, most antioxidants give little or no protection against the action of ozone on molded and extruded goods made from natural rubber, butadiene-styrene and butadiene-acrylonitrile copolymers.

It has been a common practice for a number of years to use waxes of various kinds, particularly blends of microcrystalline petroleum waxes, in rubber compounds to prevent or retard ozone cracking of dark and light colored elastomer products exposed to atmospheric ozone in static applications. These waxes exude or bloom to the surface of the rubber product and form a film which is impervious to the atmosphere, thereby preventing the ozone from coming in contact with the rubber. However, since the wax films are not as flexible as the rubber, they break and are of little value in products for dynamic service.

These waxes in the ratio of 0.5% on the rubber with about 1.0% of a good antioxidant are useful in preventing frosting *(9, 10)*. This is the result of ozonization of the rubber hydrocarbon of light colored rubber products, particularly natural rubber goods exposed, without strain, to warm humid atmospheres.

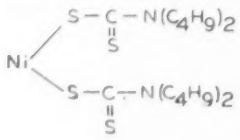
While these waxes come under the broad definition of antiozonants, it seems better to call them protective waxes *(9)* than to confuse them with real antiozonants, which can and do react *(8)* with ozone to retard or prevent the ozone cracking of rubber products. Examples of antiozonants are:

6-Ethoxy-1,2-dihydro-2,2,4-trimethylquinoline (Santoflex AW*). Its formula is



This dark colored liquid is a fairly good antioxidant which gives some protection against ozone, in ratios of 1 to 2% on the RHC, to dark colored products based on butadiene-styrene copolymers .

Nickel dibutyldithiocarbamate (NBC*). The formula is



This green powder in ratios of 0.5 to 3.0% on the RHC gives some protection against ozone to black butadiene-styrene copolymer (SBR) products in static or dynamic applications. Since it has an adverse effect on the aging of natural rubber, it is not recommended for compositions used in contact with natural rubber stocks.

In recent years some dialkyl derivatives of p-phenylenediamine have shown considerable promise as antiozonants. The formula for N,N′-Dialkyl-p-phenylene diamines is

Where R = -Octyl (UOP-88 and OZO-8835*)
R = 2-Octyl (UOP-288, OZO-88 and Tenamene 30*)

These dark colored liquids in ratios of about 3% on the polymer give good results in dark colored molded and extruded SBR goods and appear to be beneficial in similar products based on natural rubber or nitrile rubbers for both static and dynamic service.

As in the past, a large amount of research effort is expended each year by the research laboratories of the rubber and chemical companies in search for new and improved antioxidants and antiozonants so that we may expect new and better protective materials in the future.

LITERATURE REFERENCES

1. ASTM—Glossary of Terms Relating to Rubber and Rubber-like Materials, (1956).
2. Crabtree and Kemp, Ind. & Eng. Chem., Vol. 38, p. 278 (1946).
3. Eccher, Rubber Chem. & Tech., XIII, p. 566 (1940).
4. Haushalter, Jones and Schade, Ind. & Eng. Chem., Vol. 20, p. 300 (1928).
5. Norton, F. J., Rubber Chem. & Tech., XIII, p. 576 (1940).
6. Semon, W. L., Chemistry and Technology of Rubber, p. 414 (1937).
7. Shaw, Ossefort and Touhey, Rubber World, Vol. 130, No. 5, p. 636 (1954).
8. Stanley, Simms, Delman and Allison, Rubber Age, Vol. 79, No. 6, p. 967 (1956).
9. Symposium on Protective Materials for Rubber (Akron Rubber Group), Rubber Age, Vol. 77, No. 5, p. 705 (1955).
10. Tuley, Ind. & Eng. Chem., Vol. 31, No. 6, p. 714 (1939).
11. Williams, Ind. & Eng. Chem., Vol. 18, p. 367 (1926).

* Trademark.

* Trademark.

Use of Antioxidants and Antiozonants in Wire and Cable

By C. E. McCORMACK

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THE wire and cable industry is constantly confronted with a challenge to produce cables for increasingly severe service conditions. In an effort to keep pace, it is more or less standard practice in elastomer compounding to use every possible means of obtaining increased resistance to degradation. Protective agents such as antioxidants and antiozonants are among the compounders' most important tools.

The pattern of elastomer consumption by the cable industry is of interest in that it differs rather markedly from the well-known pattern of the rubber industry as a whole. Department of Commerce statistics show that of the 52,000 tons of new elastomer consumed by the cable industry in 1956, 47.5% was neoprene, 37.8% SBR, 8.5% natural rubber, and 6.1% butyl rubber. For the most part, the neoprene was used in the outer coverings or jackets of cables while the SBR, natural rubber, and butyl rubber served as the insulation.

SBR replaced natural rubber as the general purpose insulation during the emergency created by the Second World War, and today is generally preferred because of its greater resistance to oxidation and its superior electrical stability in wet locations. During the past few years, butyl rubber has won increasing acceptance as insulation for high voltage cable and also for low voltage cable designed for higher operating temperatures.

Since cable insulations are normally protected by an outer covering, there is normally no need for protection against atmospheric ozone or light initiated oxidation. Protection against ozone generated by internal corona is required, however, in high voltage cable. This is provided, in natural rubber and SBR insulations, by using a large percentage of factice, and to a much lesser extent by antioxidants.

It is normal practice to include one to three parts of selected antioxidants in natural rubber and SBR insulations. The antioxidant added to SBR during its manufacture, while effective in the vulcanized insulation, is generally considered insufficient for meeting the severe long-term service requirements. Definite benefits can be shown for high antioxidant levels.

Many types of antioxidants are used, including secondary aromatic amines, ketone-amines, and mixtures of such antioxidants with diphenyl-para-phenylenediamine. Blends containing diphenyl-para-phenylenediamine in addition to providing improved heat aging, are also effective in minimizing gel formation during the hot breakdown of SBR. The para-phenylenediamines also inhibit oxidative degradation due to the presence of soluble forms of copper. This is of importance because of the constant hazard of damage to the tin or alloy coating on copper conductors.

In those instances where the staining type of antioxidants cannot be tolerated, the octylated diphenylamines provide good aging with only moderate staining. For minimum staining, good results are obtained with the hindered phenols or with amounts of the thiazoles or their zinc salts greater than required for acceleration.

To some extent, SBR and natural rubber are used in the outer coverings of various types of cords. Such coverings normally develop ozone cracks. Some improvement in this respect is promised by the recent findings that the resistance of SBR to atmospheric ozone is greatly improved by the use of waxes in conjunction with N,N'-dioctyl-para-phenylenediamine. Similar improvements have also been reported for the butyl rubbers, particularly those with medium to high unsaturation.

Protective agents are important in neoprene compounding. The amount and type depends to a large extent on service conditions, but, in all cases, a minimum of one to two parts of antioxidant is recommended for resistance to general oxidation. Illustrative of the effectiveness of antioxidants in neoprene compounds is the fact that oxygen bomb life is increased at least ten fold by the use of one part of an antioxidant such as phenyl-beta-naphthylamine.

All of the neoprene consumed by the wire and cable industry is used in outer coverings, and is therefore exposed to atmospheric ozone and in some cases to the high concentration of ozone generated by corona discharge. Due to neoprene's inherent resistance to ozone, cracking from atmospheric ozone is not a problem with conventional good quality jacket compounds. Such compounds normally contain about two parts of antioxidant and three to four parts of selected waxes.

In view of the rather striking effectiveness of diphenyl-para-phenylenediamine in improving the ozone resistance of neoprene, it is good general practice to use such antioxidants as mixtures of diphenyl-para-phenylenediamine with either secondary aromatic amines or ketone-amines. This is especially true in jacket compounds containing less than 50% by volume of neoprene, and also in low temperature compounds containing high amounts of ester type plasticizer.

For protection against corona discharge, three to four parts of the diphenyl-para-phenylenediamine mixtures plus three to five parts of a highly soluble antioxidant, phenyl-alpha-naphthylamine, give good results. The degree of protection provided by this type and amount of antioxidant is sufficient for meeting the industry's specifications involving exposure to several hundred parts of ozone per million parts of air.

For maximum protection against heat activated oxidation, the octylated diphenylamines and p-(p-tolysulfonylamido) diphenylamine have been found useful. The latter material should not be used in excess of one part because of its tendency to bloom. In many cases, these materials are used in conjunction with diphenyl-para-phenylenediamine containing antioxidants to give improved ozone resistance. Where a high order of resistance to staining together with good heat resistance is required, good results are obtained with the zinc salt of mercaptobenzothiazole and some of the hindered phenols.

In conclusion, the wire and cable industry is using antioxidants and antiozonants in considerable quantity and, as a result, cable performance has been improved.

Division of Rubber Chemistry, A. C. S., Meets in New York on September 11 to 13

The 72nd Meeting will feature:

Twenty-five technical papers—

Luncheon meeting of the 25-Year Club—

The Charles Goodyear Medal Address—

Suppliers cocktail party and divisional banquet—

THE 72nd meeting of the Division of Rubber Chemistry of the American Chemical Society wil be held on September 11th to 13th at the Hotel Commodore in New York City in conjunction with the Annual Meeting of the parent society. The three-day divisional Fall Meeting will feature the presentation of twenty-five papers, including an invitational paper by Ross R. Ormsby, president of the Rubber Manufacturers' Association, who will speak on "Activities of the Rubber Manufacturers' Association."

Other activities of interest at the meeting will include a luncheon-meeting of the Twenty-Five Year Club, a Suppliers' Cocktail Party, a banquet, and the presentation of the Charles Goodyear Medal address by Arthur Whiting Carpenter. Mr. Carpenter has chosen as the topic of his address "The Tower of Babel."

The technical program for the meeting has been divided into four sessions, each with a general theme. On Wednesday afternoon, September 11th, a group of papers devoted to the general subject of "Compounding" will be presented. Dr. B. S. Garvey, Jr. (Sharples Chemicals), division chairman, will be in charge of this session. The following morning will be devoted to "Physical Testing and Analysis." Dr. R. F. Dunbrook (Firestone), division vice-chairman, will serve as chairman of this session. In the afternoon of the same day, Dr. J. D. D'Ianni (Goodyear) will officiate at a session on "Carbon Black and Polymers." On Friday morning, September 13th, the last technical session will be held, this one devoted to "New Polymers." Mr. Henry Peters (Bell Telephone Laboratories) will be in charge of this session.

Mr. Peters, incidentally, is serving as chairman of the Local Arrangements Committee for the meeting. He is being assisted by Herbert J. Due (St. Joseph Lead) as vice-chairman. The following have been appointed to head the activities noted: *Banquet*, George Vacca (Bell Telephone); *Program*, Ralph DeTurk (Whittaker, Clark & Daniels); *Finance*, Lester J. Koch (Westwood Chemicals); *Information*, L. D. Carver (Witco Chemical).

W. O. Hamister (Naugatuck Chemical) is serving as chairman of the Twenty-Five Year Club Luncheon which will be held on Wednesday, September 11th. A special program of entertainment has been planned for the divisional banquet.

Abstracts of the papers which will be presented at the meeting follow herewith:

Program of the
DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY
Hotel Commodore, New York, N. Y.
September 11-13, 1957

Wednesday Morning—September 11

9:00 A.M.—Registration.
11:30 A.M.—Twenty-Five Year Club Luncheon.

Wednesday Afternoon—September 11

2:00 P.M.—Introductory Remarks by Dr. B. S. Garvey, Jr. (Sharples Chemicals), Division Chairman.
2:05 P.M.—Technical Papers.

Thursday Morning—September 12

9:00 A.M.—Technical Papers.
11:00 A.M.—Business Meeting.
11:15 A.M.—Charles Goodyear Lecture by Arthur Whiting Carpenter.

Thursday Afternoon—September 12

2:00 P.M.—Technical Papers.

Thursday Evening—September 12

5:00 P.M.—Suppliers' Cooperative Cocktail Party.
7:00 P.M.—Divisional Banquet.

Friday Morning—September 13

9:00 A.M.—Technical Papers.

Wednesday Afternoon—September 11

Compounding

B. S. Garvey, Jr., Presiding

2:00 P.M.—1—Introductory remarks.

2:05 P.M.—2—New Curing Systems and Curing Agents for Hypalon Synthetic Rubber. ***I. D. Roche and W. J. Schrantz, Jr. (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Delaware). (Paper will be presented by Mr. Roche).***

This paper discusses the development of improved curing systems for Hypalon 20 based solely on organic materials and completely free of metal compounds. The improved systems are based on combinations of substituted amines, substituted phenols, organic sulfides, and epoxy resins.

The organic curing systems afford a greater latitude in controlling rate and state of cure in Hypalon 20 compounds than has been known for metal oxide cures. In addition, the vulcanizate properties compare favorably with the best obtainable from the oxide containing systems, and in fact are superior in having inherently low modulus, high elongation, and low hardness. The water resistance of these stocks is markedly superior to magnesia cured vulcanizates, but somewhat inferior to litharge cured vulcanizates.

It is expected that the organic curing systems will permit the development of new Hypalon 20 products heretofore considered impractical.

2:30 P.M.—3—The Stabilization of Mineral-Filled SBR Polymers against Surface Embrittlement. ***W. F. Abbey, R. T. Zimmerman and W. H. Cornell (R. T. Vanderbilt Co., New York, N. Y.). (Paper will be presented by Mr. Abbey).***

The use of SBR polymers in fast-curing, mineral-filled recipes for the manufacture of light-colored articles has become a common practice in the rubber industry. Occasionally, the surface of these articles becomes hard and brittle after some period of natural aging in service. They exhibit a lacquered appearance and crack when flexed.

This paper presents the results of an extended study of ways for preventing this surface embrittlement. It has been found that this surface embrittlement can be produced in the laboratory by exposing test pieces in an oxygen bomb for seven days at 80°C. (300 psi oxygen pressure). It has also been found that the amine type antioxidants are most effective in preventing this surface embrittlement. Data are shown to indicate that the state of cure developed has an effect on the resistance to surface embrittlement.

2:50 P.M.—4—Flame Resistance of Neoprene: Effect of Compounding Ingredients. ***J. F. Hagman, N. N. Mueller and D. C. Thompson (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Delaware). (Paper will be presented by Mr. Thompson).***

The resistance of neoprene and other halogen-bearing polymers to flame propagation has been amply demonstrated. An observation of the length of time a sample burns after removal of a flame source and the portion of the sample not consumed gives a qualitative measure of flame resistances. It is known that compounding ingredients have a pronounced effect on the flame resistance of all elastomers, but the tests formerly employed have been so lacking in reproducibility that conclusions on the relative merits of various compositions have had limited significance.

For this study an apparatus was developed from which reproducible measurements of resistance to flammability were obtained and indices applied to the compounds tested. Radiant heat from an electric arc is focused by two parabolic reflectors onto a small area of the test specimen. Temperature is controlled by light filters. The following measurements are taken: kindling temperature of specimen, kindling temperature of gases of decomposition, combustion time, time to extinguish, and degree of flame propagation.

Loading, in general, increases the flame resistance of neoprene, but there are substantial differences among the various types of fillers. Even among the carbon blacks great differences exist. There appears to be no correlation with particle size. Plasticizers, in general, have an adverse effect on flame resistance. This is true even for those which are themselves flame resistant, except for certain liquid, chlorinated paraffins.

3:15 P.M.—5—Higher Alkyl or Aryl Salts of Dithiocarbamic Acid as Improved Accelerators for Butyl Rubber. ***W. F. Fischer, R. F. Neu and R. L. Zapp (Enjay Laboratories, Linden, N. J.). (Paper will be presented by Mr. Fischer).***

Laboratory investigations and field service performance data have indicated that the ozone and weathering resistance of steam cured butyl vulcanizates is at a lower level than would be predicated on the basis of tests on press cured test slabs. Studies of thin films have indicated that this phenomenon can best be explained on the basis of a reduced state of surface cure caused by hydrolysis of conventional butyl accelerators in open steam. Use of this thin film technique also established the promise offered by higher molecular weight salts of dithiocarbamic acid as hydrolysis resistant accelerators.

Many such accelerators have been screened in typical butyl extrusion compounds covering a range of hardness values. The improvements offered by these materials have been confirmed in high ozone concentrations (0.2 volume per cent), low concentrations (50 pphm), and in outdoor weathering tests. In addition to work with standard ASTM test pieces, data obtained with automotive weatherstrips, appliance hoses, and electrical insulation compounds are reported. The most promising of the new accelerators have been successfully run in factory trials.

Combinations of these new accelerators with conventional butyl accelerators offer still further improvements in product quality, particularly from the standpoint of ozone resistance. Cost compounding studies are also presented.

3:45 P.M.—6—Butyl Latex Tire Cord Adhesives. ***Alfred L. Miller and Samuel B. Robison (Esso Research and Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Miller).***

The development of a butyl latex tire cord adhesive system has made an important contribution to a successful butyl tire. Because of the unusual relationships that exist between the chemical and physical properties of butyl rubber and those of the principal high unsaturation rubbers, an examination has been made of the chemistry of cord adhesives, the variables involved in their application to cord fabrics, and the significance of laboratory test values for the butyl system in terms of tire performance. This work has led to some interesting observations and results which will be described in this paper.

Based on an examination of the chemistry of RFL cord adhesive systems, it is conceived that three competitive reactions are involved and improved control of these reactions can result in an increase in adhesion. Microscopic examination of surfaces and cross-sections of treated cord have indicated that the amount of dip pick-up and its location can contribute to improved adhesion. It will be shown that control of these variables can be obtained by proper use of squeeze roll pressure. Analysis of the "H" adhesion test's relation to tire performance has raised several questions which will be discussed in conjunction with our observations on the mechanism of adhesion failure.

The best evaluation of cord adhesion is tire performance on the road and on the indoor test wheels. A discussion of the role cord adhesion may play accompanied by performance data for butyl rubber tires will be included.

4:10 P.M.—7—Compounding of Silicone Rubber. ***F. L. Kilbourne, Jr., A. S. Kidwell, R. D. Alling and Z. J. Grabicki (Connecticut Hard Rubber Co., New Haven, Conn.). (Paper will be presented by Mr. Kidwell).***

Five years of experimental work is summarized, leading to the development of high tensile, high tear strength silicone rubber compounds. The compounds have seen considerable use in the aircraft industry, where their unusual combination of properties make them particularly suitable for airframe sealing applications.

The compounding of high strength silicone rubber is discussed briefly, and compounding using alkoxy-coated silica is covered in detail. Criteria for the selection of silicone gums, especially extreme low temperature gums, and for specification of the coated filler are included. The selection and use of antioxidants, and compatible vulcanization systems, including dithiocarbamates and certain peroxides, are discussed.

Combinations of various ingredients and methods are described which made it possible to obtain the high tensile strength, excellent tear resistance, 400°F. heat stability, and resistance to ASTM No. 1 Oil itemized in the AMS 3345-46 specifications. The use of statistical experimental design is illustrated, and some discussion of the theory of reinforcement and vulcanization of silicone rubber is included.

4:35 P.M.—8—Silicone Rubber Reclaim. ***B. R. Wendrow (U. S. Rubber Reclaiming Co., Buffalo, N. Y.) and D. P. Spalding (General Electric Co., Schenectady, N. Y.). (Paper will be presented by Mr. Wendrow).***

While cured silicone rubber has been successfully reclaimed and reused for several years little information on it has been published. Silicone rubber can be reclaimed by either a wet or dry process. The wet process gives the most reliable and reproducible results. This process has been perfected on a commercial basis.

This paper includes the results of testing of wet process reclaim of all of the major classes of silicone rubber such as: General Purpose Class, Extreme Low Compression Set Class, Extreme Low Temperature Class, and Extreme High Temperature Class. These classes include all of the major types of silicone gums and recommended reinforcing fillers.

The paper reports the effect on the cured physical properties of the various classes of virgin silicone rubber caused by the incorporation of various levels of reclaim. Some unusual effects are noted. The effect on the processing characteristics of the same blends are also reported. Recommendations for optimum level of reclaim use and proper quantities of additional curing systems are also made.

Thursday Morning—September 12

Physical Testing and Analysis

R. F. Dunbrook, Presiding

9:00 A.M.—9—The Determination of Bound Styrene in Raw and Cured Polymers by Nitration. ***C. L. Hilton and J. Tolsma (Research Center, U. S. Rubber Co., Wayne, N. J.) and J. E. Newell (Naugatuck Chemical Div., U. S. Rubber Co., Naugatuck, Conn.). (Paper will be presented by Mr. Hilton).***

Although there are several methods for the determination of combined styrene in styrene-butadiene copolymers, a method was needed which would be applicable to a wider variety of samples.

Perhaps the most widely used method for determining the bound styrene in raw GR-S has been the refractive index procedure. While this method is excellent as a control method, the results obtained are influenced by the temperature of polymerization. The infrared and ultraviolet absorption techniques are not generally applicable to cured stocks because of the difficulty in separating the polymer in a soluble form from all interfering substances in the stock.

The present paper describes the quantitative determination of bound styrene in raw and cured stocks by nitration and oxidation of the polymer. The p-nitrobenzoic acid obtained is separated from other materials by liquid-liquid extraction. The styrene content is then determined from the ultraviolet absorption spectrum. The accuracy and precision of the method over a wide variety of samples has been excellent.

A modified procedure eliminating the several extraction steps is also described. The modified method is applicable where results within 2 or 3% (absolute) of the true styrene content are satisfactory.

9:25 A.M.—10—Near Infrared Studies: Rate Constants for the Alcohol-Aryl Isocyanate Reaction. ***I. C. Kogon (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Delaware).***

A new technique has been developed utilizing the near IR spectrum for obtaining rate data for the alcohol-aryl isocyanate reaction. The technique is a reliable method for determining the relative rates of carbamate formation. Second order rate constants for the triethylamine catalyzed and uncatalyzed reaction of ethyl alcohol with aryl isocyanates have been determined at 28°C. For the uncatalyzed reaction the order of reactivity of several aryl isocyanates with ethyl alcohol is phenyl > p-tolyl > o-tolyl. For the triethylamine catalyzed reaction the order of reactivity of several aryl isocyanates with ethyl alcohol is 4-isocyanato group to tolylene 2, 4-diisocyanate > phenylisocyanate = first isocyanato group of tolylene 2, 6-diisocyanate. The electron attracting activating affect of a meta isocyanate group increases the rate of reaction by a factor of approximately 8.

9:40 A.M.—11—Mooney Viscometer Studies as Related to Molded Electrical Products. ***A. A. Kessel (General Electric Co., West Lynn, Mass.).***

In the injection molding of electrical apparatus with elastomeric materials, the components are positioned within a mold and the elastomer is then forced into the mold cavity. It is essential that the force of the material on the parts during the fill operation be controlled to prevent displacement and thus insure adequate thickness of insulation between the components.

Previous work by M. Mooney has shown that the Mooney Viscometer gives a measurement of plasticity of an unvulcanized rubber. The Mooney data is normally used for quality control testing and evaluating new compounds that will conform to established specifications. This paper discusses a method of correlating the Mooney data with the parameters of injection molding.

Using Mooney's original derivations and the author's data obtained on stocks of mineral loaded butyl rubber, equations and curves are developed showing the relationships between the rate of fill, stock temperature, Mooney plasticity and the force applied to the insert during the molding process. The curves are then combined into a nomograph at a critical force. By simply determining the Mooney plasticity of an unknown stock, the optimum fill rate and temperature can be obtained from the nomograph.

10:00 A.M.—12—Measurement of the Closed Cell Content of Cellular Materials. ***W. J. Remington and R. Pariser (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Delaware). (Paper will be presented by Mr. Remington).***

An apparatus and procedure are described for determining the volume per cent of closed cells in a cellular material. The apparatus may be used to measure either rigid or flexible foams. It operates on the principle of Boyle's law, and involves the measurement of the volume of displaced air which results when a specimen of foam is placed in the sample chamber. The volume of displaced air represents the space occupied by the closed cells plus the cell walls of a foam. After correcting for space occupied by the cell walls, the closed cell content may be expressed as a percentage of the total foam volume. The test has been applied to rubber, vinyl, and polystyrene, as well as to urethane foams.

10:25 A.M.—13—Accelerated Ozone Aging Tests. ***R. R. Phelan (Enjay Laboratories, Linden, N. J.).***

It is generally recognized that ozone is the main factor that causes severe weather aging of elastomer compounds. In order to suggest an accelerated ozone test which can most accurately predict weathering performance of one polymer compared to another, a broad ozone concentration range was investigated. The study was further expanded in order to investigate the many testing variables which influence the ozone resistance of rubber vulcanizates. Natural rubber, SBR, CR, and butyl were the polymers studied, these materials ranging in unsaturation values from

less than 1 to 100%. Each polymer was compounded with 50 phr of EPC black which does not necessarily give optimum ozone resistance.

The effects of the following factors on ozone resistance are discussed: (1) Temperature of test; (2) Stress of vulcanizates; (3) Ozone concentration; (4) Polymer molecular weight; (5) Presence of nitrous oxide and organic vapors. Changes in any of these testing variables do not markedly affect the relative ranking of one polymer to another. Natural rubber and SBR always rank poorest from the standpoint of ozone resistance while butyl ranks best. However, the rate of change of apparent ozone resistance of a given polymer with changes in the testing variables is a function of the polymer being tested. Thus, the testing conditions employed do affect the magnitude of the differences in ozone resistance between polymers.

From the results of this work an ozone test is suggested which can most accurately predict weathering performance of one polymer compared to another.

11:15 A.M.—14—Charles Goodyear Lecture: The Tower of Babel: ***Arthur Whiting Carpenter.***

Thursday Afternoon—September 12

Carbon Black and Polymers

J. D. D'Ianni, Presiding

2:00 P.M.—15—The Determination of Discoloration of Rubberlike Films by Reflectance Spectrometry. ***James T. Hill and Fred Leonard (Prosthetics Research Laboratory, Walter Reed Army Medical Center, Washington, D. C.). (Paper will be presented by Mr. Leonard).***

In the course of an investigation of rubberlike films, such as synthetic acrylate elastomers and plasticized PVC for use in cosmetic gloves for amputees, it became of interest to develop methods for determining the resistance of the films to staining and yellowing.

The method developed consisted in measuring the spectral reflectance curves between 400 μ and 700 μ with a Beckman Spectrophotometer, of an unstained sample, a stained sample, and the stained sample after attempts had been made to remove the stain. The per cent stain resistance was expressed as the following ratio:

$$\% \text{ SR} = \frac{\sum_{400\,\mu}^{700\,\mu} (R_s - R_{us})}{\sum_{400\,\mu}^{700\,\mu} (R_u - R_{us})}$$

where the numerator represents the area between the spectral reflectance curves of the unstained sample and the sample from which attempts had been made to remove the stain, and the denominator represents the area between the spectral reflectance of the unstained sample and the stained sample.

A similar method was used to determine the per cent yellowing. In this instance, the standard yellow sample was that yellow developed by a sample of PVC which had been heated at 170°C. for a period of time just less than that required for brown spots to appear. The dominant wavelength, brightness and purity of this standard yellow based on ICI Illuminant C was 578 μ 38.7% and 74.0%, respectively.

The method is consistent with visual observations and has the advantage of permitting the effects to be described quantitatively. The technique is potentially useful in studying those variables which affect the color of elastomers, such as the effect of stainants, stabilizers, heat and light.

2:25 P.M.—16—Invited Paper on "Activities of the Rubber Manufacturers Association." ***Ross R. Ormsby (Rubber Manufacturers Association, New York, N. Y.).***

2:50 P.M.—17—The Absorption Spectrum of Carbon Black Dispersions in Mineral Oil. ***Andries Voet (J. M. Huber Corp., Borger, Texas).***

The light transmission of very dilute dispersions of carbon black in mineral oil was investigated in the range from 2300 to 2400Å. It appears that the Lambert-Behr law is accurately followed in the concentration range investigated, 0.001 to 0.01 percent by weight.

All carbon black dispersions show similarities in their spectral curves, with straight or slightly curved lines down to 2840Å and marked minima and peaks in the lower ultraviolet range. There are, however, striking differences characteristic of the type of black. Thus, color blacks are easily identified from spectral curves. Carbon blacks usually referred to as structure blacks have a characteristic ultraviolet absorption. In addition, the surface area of the black can be directly related to the absorbence of the dispersion.

The scattering coefficient, as calculated from the transmission data, is smaller than unity, in agreement with conclusions drawn from electrical measurements indicating that the dispersed particles are larger aggregates of the elementary particles.

3:15 P.M.—18—The Chemistry of Reinforcement. V—A Study of TMTD (Sulfurless) Vulcanizates Containing Carbon Black. ***Merton L. Studebaker and Lester G. Nabors (Phillips Chemical Co., Akron, Ohio). (Paper will be presented by Mr. Studebaker).***

A series of natural rubber vulcanizates were prepared which contained various types of carbon black. Tetramethylthiuramdisulfide (TMTD) was used as the curing agent. The cured samples were "devulcanized" by treatment with air in boiling o-dichlorobenzene, and the carbon black was removed by filtration. Ultimate analyses of the carbon black fractions and the rubber fractions and cross-linking measurements on the original vulcanizates permit certain conclusions to be made regarding vulcanization by TMTD in the presence of carbon black. The carbon blacks are shown to increase the cross-linking efficiency of the curing agent. Some of the sulfur which is added as TMTD remains in the carbon black fractions and is not available to form the cross-links which are measured by the swelling procedure. Aside from the sulfur so removed, approximately eight sulfur atoms (two molecules of TMTD) must be added to the stock to produce one cross-link.

3:40 P.M.—19—Halogenation of Butyl Rubber Using Iodine Monochloride and Iodine Monobromide. ***R. T. Morrissey (B. F. Goodrich Research Center, Brecksville, Ohio).***

Bromination of butyl rubber has produced a polymer having several properties superior to butyl itself. Among these improvements are better covulcanization with natural rubber and GR-S and increased adhesion to other elastomers and metals. Further study has been made of the products made by the reaction of other halogens with butyl rubber. The effectiveness of the different halogens in modifying butyl rubber can be summarized conveniently in the following scale: Br $>>$ Cl $>$ F $>>$ I.

The combination of bromine or chlorine with iodine in the form of iodine mono-bromide or iodine monochloride has modified butyl rubber in nearly the same manner as bromine alone. This discovery is of special interest in view of the fact that iodine and chlorine alone have yielded products inferior to brominated butyl. The halogenation reaction involves mainly addition to the double bonds of the isoprene units. This is substantiated by the fact that the mole percent unsaturation of butyl decreases as a linear function of the moles of halogen present in the polymer.

Studies of the reaction of I Br and I Cl with butyl rubber have shown that only a portion of the iodine remains in the halogenated polymer. In these reactions some of the iodine is believed to split out as hydroiodic acid. The iodine remaining in the polymer probably takes part in a metal oxide cure of the polymer.

4:05 P.M.—20—Effect of Catalysts on Urethane Foam Properties. *B. G. Alzner and Kurt C. Frisch (Wyandotte Chemicals Corp., Wyandotte, Mich.). (Paper will be presented by Mr. Alzner).*

Physical properties of flexible polyether-diisocyanate foam made with six different catalysts are compared. Two catalysts derived from piperazine—N,N'-bis-(2 hydroxypropyl)-2 methylpiperazine and N,N'-diethyl-2 methylpiperazine—N-(2 hydroxypropyl)-dimethyl morpholine have a low odor level. The other three catalysts—N-methyl morpholine, triethylamine and dimethylaminoethanol—are recommended in the literature for preparation of urethane foams.

Foaming rate, curing rate, foam density, shrinkage, compression-deflection values, compression set, resilience, tensile and tear strengths are compared and discussed in the light of the chemical nature of the catalysts. Physical test data showing use of the catalysts in making a typical cushion grade urethane foam is given. Information provided may be utilized in selecting a catalyst to produce foams of desired physical properties and softness.

It is shown that faster gelling catalysts result in softer foams of lower density than slower gelling ones. The foam properties from the slow and fast gelling catalysts may be combined in varying degrees by the combined use of two such compounds. Odorless foams made with piperazine-type catalysts are comparable in most physical properties to odor-bearing foams made with the catalysts recommended in the literature.

Friday Morning—September 13

New Polymers

Henry L. Peters, Presiding

9:00 A.M.—21—New Fusible Silicone Rubber Compounds. *F. Fekete and J. H. Lorenz (Silicone Division, Union Carbide Corp., Tonawanda, N. Y.). (Paper will be presented by Mr. Lorenz).*

A new family of recently developed silicone rubber compounds offers distinct advantages in the electronic field. These compounds, which are fabricated and cured by conventional means, have the unique property of fusing together when pressed or wrapped under slight tension; heating at moderate temperatures accelerates the fusing into a homogeneous mass. In addition, these compounds exhibit a building tack such that they will stick to themselves immediately upon application. Thus, no pressure binding or molds are needed for the final cure.

The fusible compounds show excellent physical and electrical properties; they may be calendered, extruded or solvent dispersed for dip coating. Besides fusing to themselves or other silicone rubber compounds, these materials show promise for improving bonds of silicone rubber to fabrics and metals.

The insulating class of the fusible compounds show excellent resistance to reversion, good heat stability and high tear strength. This class, which on glass cloth exceeds existing military specifications for silicone rubber tapes, has proven useful in cable wrapping; other wrapped articles, such as hot air ducts, can easily be fabricated.

A second class of fusible compounds is electrically conductive, with a resistivity in the range of 1 to 2 ohm-cm. This material has utility as a heat source; fusible compounds with intermediate resistivities, obtained by blending of compounds, show promise as corona precipitators.

This new family of silicone rubber compounds are sure to have application wherever bonding of silicone rubber to rubber, metal or fabric is a problem.

9:25 A.M.—22—A Solvent-Resistant Fluorosilicone Rubber. *T. D. Talcott, E. D. Brown and G. W. Holbrook (Dow Corning Corp., Midland, Mich.). (Paper will be presented by Mr. Brown).*

Rapidly advancing aircraft and industrial developments have extended the temperature requirements of solvent-resistant elastomers. Much interest has therefore developed in a new fluorosilicone rubber which combines the excellent high temperature characteristics typical of silicone rubber with excellent solvent and oil resistance.

This paper discusses the properties of fluorosilicone rubber and their effect upon intended applications. Included are physical properties, low temperature characteristics and the effect of aging at elevated temperatures. Emphasis is placed upon the resistance to various types of solvents and oils and the effects of both time and temperature of immersion. Data on modifications are included. Blending with other polysiloxanes provides elastomers with special solvent and oil resistant characteristics. Effects of fillers and vulcanizing agents are discussed.

Many applications for silicone rubber have been hindered by the lack of resistance to certain oils and solvents. This new elastomer shows promise in many of these potential applications.

9:50 A.M.—23—Polyurethane VC—A Virtually Cross-linked Elastomer. *C. S. Schollenberger, H. Scott and G. R. Moore (B. F. Goodrich Research Center, Brecksville, Ohio). (Paper will be presented by Dr. Schollenberger).*

Many of the outstanding physical properties that characterize elastomeric polyurethanes have been realized in a soluble, thermoplastic variety, Polyurethane VC, which displays the superficial properties of a rubbery vulcanizate at room temperature and so is considered to be virtually cross-linked.

High tensile strength as well as good tear, abrasion, solvent, oil, and ozone resistance characterize this polymer. Since these properties are realized in the unvulcanized state, many useful applications of the readily processable polymer can be made avoiding the complications which attend the use of conventional (vulcanizing) urethane elastomers.

Studies of the adaption of Polyurethane VC as an outer jacket for WD-1 (infantry field communication) wire on a contract with the U. S. Army Signal Corps demonstrated a deficiency in the weather resistance of the raw polymer. Weather-induced changes, believed to be due to ultraviolet-initiated autoxidation, have been estimated by noting changes in the stress-strain properties as well as the ultraviolet and infrared absorption spectra of the polymer on exposure to natural and artificial weather conditions.

The beneficial effects of certain carbon blacks, conventional antioxidants, and ultraviolet absorbers on the weather resistance of the polymer are described.

10:15 A.M.—24—Alkyllithium Polymerization of Isoprene. *C. F. Gibbs, Hugh E. Diem and Harold Tucker (B. F. Goodrich Research Center, Brecksville, Ohio). (Paper will be presented by Mr. Diem).*

A study of the alkyllithium polymerization of isoprene has shown the following characteristics:

(1) Conversion increases linearly with time, either in bulk or solution, up to the point where increased viscosity has reduced the monomer diffusion rate.

(2) The molecular weight is directly proportional to the conversion.

(3) Induction periods are either brief or non-existent.

(4) The polymer produced, except as noted below, is largely a *cis*-1, 4-polyisoprene, together with a small amount of 3, 4-polymer. The amount of 3, 4-structure is independent of the conversion. It is, however, dependent upon the effective catalyst concentration, upon the solvent, and upon the polymerization temperature. At a given effective catalyst concentration, polymerization in aromatic solvents gives more 3, 4-structure, and polymerization in aliphatic solvents less 3, 4-structure, than is obtained for bulk polymerization.

(5) The polymerization is sensitive to oxygenated impurities, and compounds with active hydrogen, such as oxygen, carbon monoxide, carbon dioxide, amines, ethers and certain unsaturated hydrocarbons. Most of these impurities stop the polymerization.

(6) The ether class of impurity changes the course of the polymerization, rather than stopping it, to give a polymer with a high amount of 3, 4-structure. Even as little of various ethers as half the molar amount of the alkyllithium serve to substantially alter the structure of the resulting polymer.

(7) Generally, the isoprene and hydrocarbon solvent must be carefully purified and the polymerization conducted with rigorous exclusion of moisture and oxygen. Catalyst requirements may be

as low as 0.05 millimoles of alkyllithium per mole of monomer. A number of various alkyls are suitable.

(8) Alkyllithiums offer some advantages and encounter some disadvantages when compared to lithium as polymerization catalysts.

10:40 A.M.—25—*Cis*-1,4-Polyisoprene Prepared with Alkyl Aluminum and Titanium Tetrachloride. *H. E. Adams, R. S. Stearns, W. A. Smith and J. L. Binder (Firestone Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Adams).*

The alkyls of aluminum have been used with titanium tetrachloride to catalyze the polymerization of isoprene. By the proper adjustment of the relative amounts of the two components of the catalyst and the temperature of polymerization, it is possible to form *cis*-1, 4 polyisoprene free from the *trans*-1, 4 configuration. Catalysts containing a 1.0 to 1.0 mole ratio of alkyl aluminum to titanium tetrachloride will produce polymers of this configuration upon polymerization at room temperature. If the temperature of polymerization is lowered, somewhat higher ratios are needed to achieve the same result.

Catalyst levels of 3 to 5 parts per hundred monomer of total catalyst are required to obtain 100 per cent yield in four hours at room temperature. Solution polymerization was used to control the reaction and obtain a uniform product. The inherent viscosities of the polymers made under these conditions are quite low, usually 2.0 to 2.5. However, higher molecular weight polymers are produced if the polymerization temperature is lowered.

Compounding studies indicate that vulcanizates of these polymers possess gum tensile properties quite comparable to those of natural rubber. Hysteretic properties of the carbon black vulcanizates of the polymers that have been prepared are inferior to those of natural rubber.

11:05 A.M.—26—Low Temperature Properties of 80 Per Cent *Cis*-Polybutadiene. *H. E. Railsback and Q. L. Morris (Phillips Petroleum Co., Bartlesville, Okla.). (Paper will be presented by Mr. Railsback).*

Polybutadiene rubbers have been found to display excellent freeze resistance when the *cis* configuration is in the range of 80 per cent. The outstanding freeze resistance observed (Gehman freeze points as low as —100°C.) made a comprehensive study of the low temperature characteristics of rubbers of this type mandatory. It was realized that reliable predictions of arctic service performance from laboratory tests would be difficult. Therefore, particular attention was given to tests designed to give the most reliable indication of both first and second order transition.

The rubber selected for study had a Mooney viscosity (ML-4 at 212°F.) of 18. The configuration was 78.6 per cent *cis*, 16.6 per cent *trans* and 4.8 per cent vinyl. Tests performed included Gehman freeze point, rate of retraction, cold compression set, resilience and Shore hardness; properties were determined at test temperatures as low as —115°C. and conditioning times up to 70 hours.

The 80 per cent *cis* polymer gave a Gehman freeze point of —97°C. (SBR 1500, —52°C.; natural rubber, —61°C.) and less tendency to crystallize (first order transition) than natural rubber or emulsion polybutadiene, under the conditions used. The 80 per cent *cis* rubber gave much softer and more elastic stocks at low temperature than any of the controls. Polybutadienes of this structural configuration display stress-strain properties similar to emulsion-polymerized polybutadiene and hysteresis properties equivalent to natural rubber. Although not now commercially available, this type of polymer should prove to be useful in general applications and to be outstanding for low temperature service.

Coming Next Month...

Effect of Foaming Catalysts on Hydrolysis Aging of Urethane Foams—By Joseph Winkler, American Cello Corp., Ridgefield, N. J.

The author analyzes the role of the activator in the aging velocity of resilient foams, and describes research for a new activator which can be tied into the foam structure. (Note: This paper was originally scheduled for publication in the July issue.)

Procedures in Obtaining Patents—By Kenneth W. Brown, Arthur S. Collins and Curt B. Beck, Godfrey L. Cabot, Inc., Boston, Mass.

The four-part series is concluded with a discussion of reading and interpreting patents, a warning about public use of an invention, and points on trademarks and copyrights.

How Johnson Rubber Used a Battery of Boilers to Solve Its Steam Problem.

Johnson Rubber of Middlefield, Ohio has found that use of a battery boiler system has increased efficiency in supplying steam to its plant.

Symposium on Latex: Natural and Synthetic.

A panel at the June meeting of the Southern Rubber Group discussed natural and butadiene-styrene latices, compounding problems and use in textiles, fibers and paper.

How Hewitt-Robins Uses Control Instrumentation in the Production and Testing of Fire Hose

By JOHN V. KELLY
Plant Engineer, Hewitt-Robins, Inc., Buffalo 5, N. Y.

THOUGH seemingly simple, the process of producing fire-hose with qualities more than adequate to pass the rigid specifications of the Fire Underwriter is actually the result of years of experimentation and research. Hewitt-Robins, Inc. of Buffalo, N. Y. has been providing fire-hose to professional and volunteer firemen for more than 80 years. During the evolution of the production and testing techniques involved in supplying this and other rubber requirements of the world, the company has learned the necessity of dependable control instrumentation.

Figure 1 is a schematic layout of the process of fire-hose manufacture. The points marked "Taylor Control" indicate use of control instruments manufactured by the Taylor Instrument Companies of Rochester, N. Y., which Hewitt-Robins employ in the manufacture and testing of the hose.

The weaving of a standard size fire-hose jacket, while an accessory to the actual process of producing the hose, is nevertheless an important part in the completion of an assembled length. At Hewitt-Robins the jackets are woven, for various size hose, in an air conditioned room, on two upright circular looms. One of these looms is seen in Figure 2. The other loom is directly behind the stacked jackets. A Taylor Recording Psychrometer is seen on the post. This room is held at a constant controlled dry-bulb temperature of 70°F., and a wet-bulb temperature of 60°F. A relative humidity of 55 per cent is maintained.

Note: This article is based on material which originally appeared in Taylor Technology, Vol. 8, No. 2, Winter, 1956.

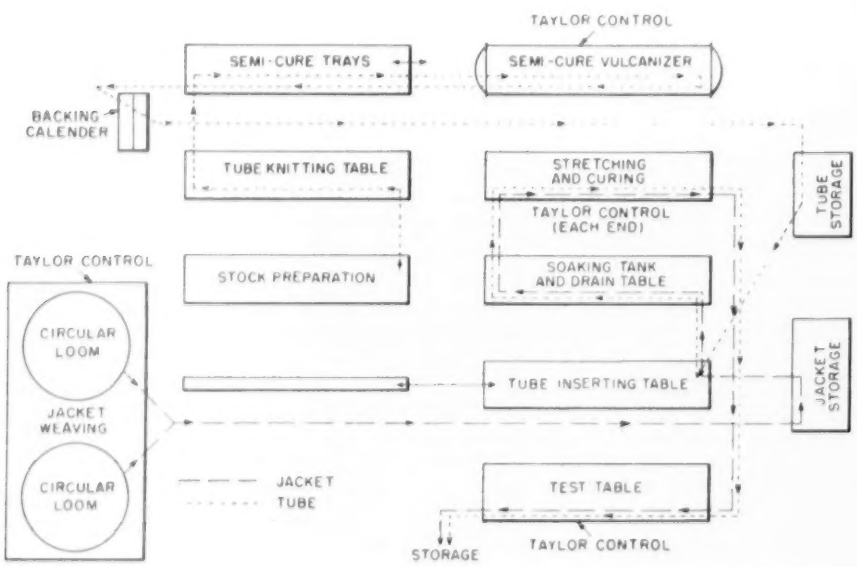


FIG. 1—Schematic representation of the process used in the manufacture and testing of fire-hose.

Automatic control instruments give uniformity in the manufacturing processes, and also provide an ingenious means of testing the finished hose.

Rubber Tube Process

Rubber tubes are either lap-cemented with one-fourth inch overlap to the longitudinal edges, or are extruded. They are then placed on screen trays 60 feet long and are loaded by electric drive into a horizontal vulcanizer, where they are given a semi-cure of from three to ten minutes, depending on their size. Temperatures vary from 260 to 300°F., and are controlled by steam pressure. Both steam pressure and condensate exhaust are automatically controlled by a Taylor Temperature Fulscope Controller, like the one in Figure 3, where it is being used for control of the final cure.

The tubes are then backed up on a "backing calender" where a rubber coating of from 16 to 20 thousandths of an inch is applied, top and bottom, for adhesion to the jacket. They are now ready to receive their jackets, prior to the final curing. The jackets are placed on a long table on one end of which is a motor driven reel which is run through the jacket until the reel clamp is exposed at the opposite end. The tube is clamped, the motor reversed and the tube is drawn through the jacket. The tube ends are suitably trimmed by the operators at the "filling table."

The jacketed tubes are placed in a soaking trough which removes excess sizing to give them pliability. They are then placed on a rack for draining excess moisture.

The final cure is accomplished with steam injection on a rack table vulcanizer as illustrated in Figure 3. The tubes are fitted over hollow cones, then clamped and drawn up by electric gun to a length of 52 feet (in the case of 50-foot length finished hose). This "drawing up" is actually a stretching operation. Steam is then injected in the tubes and the temperature controlled by pressure. A Taylor Temperature Fulscope Controller at the far end of the vulcanizer, like the one used in giving the semi-cure, controls the condensate exhaust in the system.

When the hose is cooled, suitable bronze couplings are attached to the tube ends, and it is ready for inspection. The jackets will be stamped with the Hewitt-Robins trade-mark, sizes and pressure specifications.

Testing of the Hose

The final step in the process involves pressure tests which must meet the specifications of the Fire Underwriters. The hose must endure the pressure limitations as specified. The pressure range span on various hose is from 200 to 1000 psig hydraulic, and records must be kept of every test made.

FIG. 2—A view of the loom room where fire-hose jackets are woven. Humidity-temperature control are necessary for uniform production.

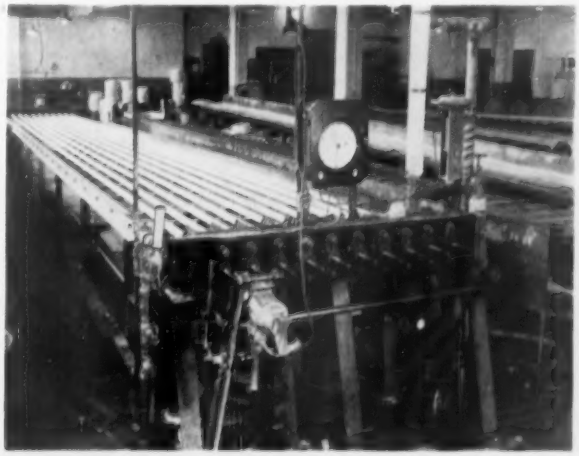


FIG. 3—The final cure of the hose on the rack vulcanizer. The Taylor instrument controls the condensate exhaust in the system.

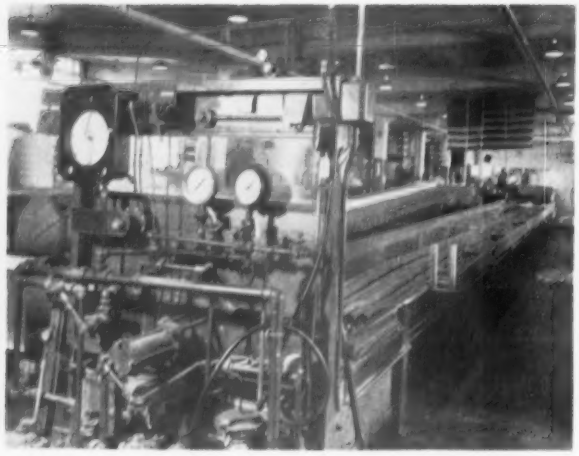


FIG. 4—The fire-hose test table. The process is observed by the operator through the safety-glass window behind the pressure gages.

Every engineer knows that hydraulic pressure (in this case water) is not easy to control. Water is non-compressible. A slight leak through a valve, if only a few additional drops more than are necessary to maintain, for example, 420 psig, would increase the pressure downstream tremendously. Therefore, poor and unacceptable control would result. Also, the higher pressures involved would obviously increase the hazard of poor control.

In the testing of fire-hose the "dead-end" test is used, that is, the end of the hose opposite the hydraulic or water inlet end is tightly capped. All "dead-end" conditions increase the difficulty of steady, on the line control. This all-important test is, at least superficially, a minor operation in producing top-quality fire-hose, but it is by no means a simple problem of control.

One end of the hose (one at a time is tested) is clamped to the outlet hydraulic pressure fitting behind the instrument panel shown in Figure 4. The other end of the hose, as stated previously, is capped with a high pressure fitting.

Obtaining Stable Hydraulic Control

Figure 5 illustrates the details of the simple, yet positive method employed to obtain stable hydraulic control. The pressure applied to the hose is measured by a recorder, and the record made by this instrument is kept for proof that the hose was tested at the specified pressure and for the specified length of time.

The hydraulic pressure on the hose is controlled by means of a diaphragm operated pressure regulator. The air pressure applied to this regulator is adjusted by means of the "remote pressure setting valve" in the air supply line. The air pressure applied to the top of the pressure regulator is also indicated in the recorder.

The recorder is specially designed in that the set pointer, which is actually the recording pen, is actuated by air to a bourdon spring which permits the pen to be set by manual operation of the "remote pressure setting valve" to any pressure desired on the chart. This indicates the hydraulic pressure on the hose that will be controlled by the "high pressure regulating valve."

The reason for this indication of the pressure is to permit the operator to adjust the pressure to be applied in a given test before he opens the high pressure water supply hand valve. After the pressure setting has been adjusted in the recorder, the supply line valve is opened and the pressure on the hose reaches the value indicated on the recorder. The high pressure regulating valve snaps shut because the hydraulic pressure overcomes the air pressure on the top diaphragm.

The consensus at Hewitt-Robins is that good instruments plus engineering know-how and ingenuity of applications produce simple answers to many difficult problems. The reputation for uniformity of the company's fire-hose attests the dependability of the simple hook-up which has been described here in the final check of the product.

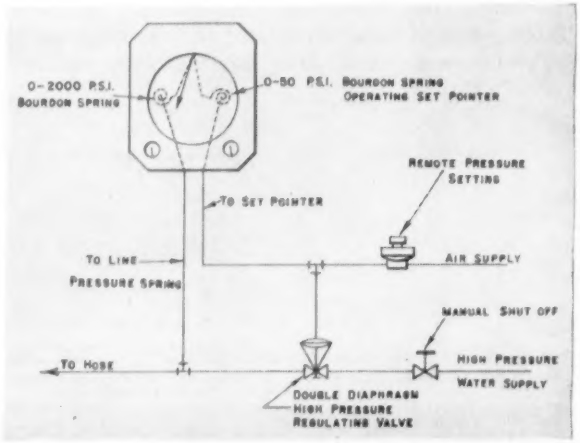


FIG. 5—Schematic of the control hook-up showing the valving arrangements employed to obtain stable hydraulic control in hose testing.

► A new **cutting rule steel** that combines hardness and ductility for dies with sharp angles or intricate shapes is available from Athenia Steel Division, National-Standard Co., Clifton, N. J. It is said to hold a cutting edge longer, cut a larger number of pieces in one stroke, and assure a smooth cutting edge.

► Richardson Scale Co., Van Houten Ave., Clifton, N. J., is the manufacturer of a **flat belt bag conveyor** which features variable belt speeds and an adjustable frame which is telescopic in design to provide a choice of conveying lengths.

► A new line of Speed King ¼-inch four-way foot-mounted **control valves,** said to afford compact size, extremely fast operating response, multi-million cycle dependability and low cost is available from Valvair Corp., 454 Morgan Ave., Akron, Ohio.

Editorials..

Quality Problem

► REPORTS of a continuing decline in the quality of natural rubber imports have evoked some serious comment from the Rubber Manufacturers Association. The Crude Rubber Committee of RMA has revived its "Rubber Quality Bulletin", the latest edition of which (Volume 3, No. 1) alerts industry purchasing agents to the fact that the condition of imports is such that heavy dollar penalties are being imposed on manufacturers who fail to inspect their rubber and to press claims for adjustment on off-quality tenders.

The bulletin raises some interesting points with reference to the price-quality relationship of natural rubber. It seems that a review of the quality import data for the six years from 1951 through 1956 indicates that the general level of natural rubber quality decreases as the natural rubber price increases. Based upon these annual reports, the quality level was best during 1953 and 1954 when the average annual price for No. 1 Ribbed Smoked Sheet was less than 25c per pound.

For the two preceding years, as well as the two succeeding years, when the average annual price was 34c or greater, quality suffered substantially. The bulletin states that when prices are relatively high and the differentials between grades are relatively wide, an incentive is created for the unscrupulous packer to sell rubber as a grade higher than it actually is. These practices are not discovered by the buyer whose inspection methods are inadequate.

The RMA Crude Rubber Committee is of the stated opinion that rubber packers are sufficiently familiar with the standard grades to prepare them properly. Therefore, the packers must be consciously aware that they are preparing rubber below the grade contracted for, the committee believes. It is noted that many conditions exist in the rubber market which make it continually profitable to pack substandard rubber. The RMA Crude Rubber Subcommittee does not anticipate any significant change in market conditions that would be conducive to any substantial improvement in natural rubber packing.

The committee concludes, therefore, that the manufacturer's best defense in the face of this unsatisfactory situation is strict inspection of all deliveries and the prompt filing of compensatory claims.

It is apparent to all that inspection and the filing of claims does not, in reality, get to the root of the natural rubber quality problem. As defensive mechanisms, these approaches can only lessen the financial burden of inadequate stocks. The root of the matter lies elsewhere. It is obvious that stricter controls are needed at the point of origin. Most segments of the natural rubber producing industry recognize the problem and from time-to-time have taken steps to alleviate these quality difficulties.

In consideration of the fact that the natural rubber industry is waging an uphill struggle in its competitive battle with synthetic, it does seem that the time has now come for a concentrated effort by all concerned to more sharply define quality standards and to meet these standards. The International Rubber Study Group has reported that rubber consumers outside the United States are showing a continued and growing interest in the use of synthetic rubber. Natural rubber, saddled with a quality problem, will find its competitive position further weakened. More stringent quality control, on the other hand, will do much to reinforce natural rubber's position in the marketplace.

Congratulations

► THE synthetic rubber industry found itself on the receiving end of a government commendation on July 1 for the second time since it took over ownership and operation of the producing facilities. In his second annual report to Congress on the competitive aspects of the industry under private ownership, Attorney General Herbert Brownell stated that a "fully competitive" synthetic rubber industry was being developed in the United States. Although he cited relative price stability as an area of possible concern, the Attorney General told Congress that the 1956 developments as a whole reflect favorable progress toward the development of a free, competitive industry.

The Attorney General interpreted the 50 per cent increase in the industry's productive capacity over the preceding twelve months as evidence of interest on the part of producers to expand their markets rather than restrict supply in the interest of profits. His report also noted that even capacity far in excess of requirements had not discouraged investment in this field by companies which had not acquired government-owned plants in the disposal program.

Mr. Brownell reported that small firms in the industry are satisfied that they are getting their fair share of the domestic output of synthetic rubber at fair prices and in improved quality. His report also mentioned that rivalry, based on service, quality, and similar inducements, served as an offset to relative price stability. In any event, he stated, the full effect of the expansion of capacity in the industry has not yet become apparent.

The Attorney General noted that the West Coast was still without as much competition as the government had originally hoped for in that area. In balance, however, this does not seem to be a criticism. More likely, it reflects the aggressive program undertaken by the one company operating in this area.

In all, the synthetic rubber producing industry has, through a most difficult time, acted in the best interests not only of the rubber industry itself, but of the nation. Congratulations are in order.

Highlights Sidelights *of the News . . .*

July, 1957

Five top officials of the Administration are reported to have "buried" the idea of a Federal alcohol-butadiene program . . . The proposal, which encompassed the idea to convert surplus corn to alcohol and butadiene, was put forth several months ago by a Presidential commission on new uses for farm products . . . It seemed to some of the officials that it was neither fair nor logical for the Government to enter into competition with private producers (page 643).

GSA has reported a net operating profit of some $13 million in the operation of the natural rubber security stockpile program between December 29, 1950 and December 31, 1956 . . . The natural rubber inventory has been evaluated as being over $800 million at the end of the period . . . The gross operating profit accumulated on the rotation and up-grading of stockpile rubber in this period amounted to more than $23 million (page 648).

The Department of Justice is believed to have decided not to appeal to the Supreme Court a lower court decision invalidating an FTC order limiting discounts on bulk purchases of tires to single carload orders . . . The next step may be a drive for the enactment of legislation prohibiting manufacturers of tires from operating in the retail field . . . Hearings on such a bill have been promised for the near future (page 645).

In accordance with a directive from Congress, the Attorney General of the United States has reported that the privately operated synthetic rubber industry appears to be developing satisfactorily in relation to the anti-trust laws . . . The Attorney General noted that the synthetic rubber industry gives indication that a fully competitive status is slowly emerging, although he noted that the West Coast area was still without much competition (page 646).

U.S. production of rubber producing chemicals in 1956 fell by about 6 per cent from the 1955 figures according to a Tariff Commission report . . . The 1956 total was 167 million pounds, compared to 177 million in the preceding year . . . Decreased consumption of chemicals in 1956 resulted from lower consumption of rubber during the year (page 646).

NEWS REPORTS and Industry Activities

U.S. Rubber to Invest $40 Million in 1957

► U. S. Rubber Co., New York, N. Y., has announced plans to invest $40 million during 1957 for expansion and modernization of the company's plants and branches. The announcement was made by H. E. Humphreys, Jr., president of U. S. Rubber at a luncheon held after ground breaking ceremonies for a new branch and warehouse in Philadelphia, Penna. Mr. Humphreys said that U. S. Rubber will have a total investment of approximately $10 million in Philadelphia when current projects are completed.

The new branch will represent a total investment of more than $5 million, including inventories and accounts receivable. It is expected to be finished next spring, and will provide faster, more efficient service to customers for tires, footwear, industrial rubber goods and other company products in the Philadelphia area, southern New Jersey and Delaware.

The 102,500 square foot, one-story structure will replace the present branch located at Fifth and Locust streets. Warehousing facilities are completely mechanized and the seven-acre site provides for off-street parking as well as room for future expansion.

The company has also invested approximately $5 million in another Philadelphia installation, the Tacony plant, which manufactures a varied line of belts for power transmission. Nearing completion is a new addition to this plant to provide more production facilities for what is considered to be one of the company's most promising new products, the timing belt.

A rubber and fabric belt with teeth, the timing belt is said to give non-slip, silent power transmission with split-second precision at speeds ranging from 30,000 feet per minute to one revolution per year. For the development of this belt, its inventor, Richard Y. Case, was awarded the Edward Longstreth Medal conferred by the Franklin Institute of Philadelphia.

Mr. Humphreys described the over-all business outlook for U. S. Rubber as good both nationwide and in the Philadelphia area, saying that this year the company's Philadelphia branch expects to increase sales about 13 per cent over 1956. He noted that many of U. S. Rubber's new products are in fields not commonly associated with the rubber industry. The rubber industry's expansion in the fields of plastics, chemicals and textiles, he said, is one of the reasons why the industry is growing faster than the average of all industry.

Ground Broken For New Plant

► B. F. Goodrich Chemical Co., Cleveland, Ohio, broke ground on May 14 at Henry, Ill. for the construction of a new $5 million specialty organic chemicals plant. Completion of the initially-planned construction stage is scheduled for early 1958. Informal ceremonies to mark the ground-breaking were held at the plant site.

Federal Alcohol-Butadiene Program Buried Under Torrent of Criticism

Officials register sharp protests against proposed legislation

► According to current reports five top officials of the Administration have buried the idea of a Federal alcohol butadiene program under a torrent of criticism. The proposal to convert millions of bushels of surplus corn to alcohol and butadiene (an ingredient of synthetic rubber) was put forth several months ago by a Presidential commission on new uses for farm products. It was embodied in a bill sponsored by Senators Paul Douglas (Dem., Ill.) and Carl Curtis (Rep., Neb.).

Asked to comment on the bill, these Federal officials registered sharp protests against it: True D. Morse, Acting Secretary of Agriculture; W. Randolph Burgess, Acting Secretary of the Treasury; Wilber M. Brucker, Secretary of the Army; Sinclair Weeks, Secretary of Commerce; and Franklin G. Floete, General Services Administrator. Comptroller General Joseph Campbell raised the initial objections to the bill (S. 1741) a month ago.

The most significant objection has come from Mr. Morse, whose department has the greatest Federal interest in disposing of surplus grains. S. 1741 would authorize a designated agency to revive several Government and private alcohol and butadiene plants and enter the commercial markets for alcohol butadiene and its by-products.

Butadiene produced from grain alcohol was produced during World War II and the Korean War but cannot compete in peacetime markets with butadiene based on petroleum and natural gas. Mr. Morse said there was room for research on the by-products from conversion of alcohol into butadiene but he said this was not laboratory or pilot-plant research, but "large plant" development. Carrying this idea a step further, Mr. Burgess protested that S. 1741 embodied not a research project "but rather a large-scale commercial operation in heavily-subsidized competition with private business."

The Government's butadiene and by-product output, he complained, would compete directly with the very people who were promised freedom from Government competition when they purchased the Government's synthetic rubber plants.

"Neither Fair Nor Logical"

"The companies, which bought 26 of the 27 Government-owned synthetic rubber plants", he reminded the Senate Banking Committee, "have expanded capacity and found new industrial applications for their products. They have successfully filled the needs of industry and are creating an export market, all without any increase in the price of synthetic rubber. It seems neither fair nor logical for these purchasers of the Government facilities to have to face substantial competition subsidized by the Government . . ."

"Among the unfortunate results, this would undoubtedly create a large surplus of butadiene which would not only have a depressing effect on the market, but would necessitate a cutback in private production and stifle any incentive for

further growth among the private producers." Commerce Secretary Weeks said alcohol butadiene "has long since" been rendered "economically obsolete" by the private economy. As for the prospects of cutting down grain surpluses, he said the program to dispose of grains abroad had run into problems which could be anticipated for a domestic disposal program. "To us, this represents an attempt to correct the results of one inflationary program by adopting another inflationary measure," the Secretary declared.

No National Defense Need

Mr. Brucker, Army Secretary, said the Douglas-Curtis program was not necessary in the interests of national defense. He also reminded the committee that the military has already indorsed the disposal of one of the plants which would be used in the program—the Government's alcohol butadiene plant at Louisville, Ky.

Sale legislation for the Louisville plant has been held up by the Senate Banking Committee since the Douglas-Curtis program was proposed earlier this year by the Welsh Commission. The commission, in its final report sent to Congress over the week-end, officially withdrew its recommendation for a large-scale alcohol-butadiene program, but the Louisville disposal bill remains in a drawer. Meanwhile, GSA Chief Floete, in his report to the banking unit, called the Louisville property—plus an alcohol plant at Omaha—"two valuable plants which could be profitably disposed of" by the Government.

Sues Former Employees

► Phoenix Manufacturing Co., Joliet, Ill., has named three former employees among defendents in a $1 million damage suit alleging a conspiracy to form a competing company. The company named Joseph H. Nieberding, former sales manager in charge of the Rubber Products Division; Clifford Spencer, formerly in charge of rubber products manufacturing and Charles H. Skuza, formerly chief chemist. Phoenix alleges that Messrs. Nieberding, Spencer and Skuza are officers of the South Haven (Mich.) Rubber Co. and while under contract to the Illinois company, conspired to perform wrong acts that damaged Phoenix. The suit, filed in the Circuit Court of Will County, is a counter-claim to a suit brought by Mr. Nieberding asking for an accounting in connection with commissions allegedly due him under employment contracts.

Albert-Harris Sued

► Wolverine Tube Division of Columet & Hecla Inc., Detroit, Mich., has sued Albert-Harris, Inc., Akron, Ohio, for $15,143. The suit claims that Albert-Harris took over Pamco Corp., a Texas company, in 1953 and that Edward J. Harris, president of Albert-Harris, had guaranteed payment of the Texas company's obligations. The $15,143 is owing for "goods and wares" furnished Pamco by the Detroit firm, the suit says.

Forms New Sales Division

► Jefferson Chemical Co., Inc., Houston, Texas, has announced the formation of a new division to market caustic soda and other alkalis. The new Alkali Sales Division will be headed by William F. Phillips, who was formerly associated with American Cyanamid Co. Jefferson will assume responsibility on July 1 for sales and service of alkalis formerly marketed by Cyanamid, and personnel who have handled these products for Cyanamid will transfer to Jefferson on that date. The move is being made as a forerunner to production of caustic soda by Jefferson in the company's new chlorine plant at Port Neches, Texas, which is scheduled for completion late in 1958. The plant is part of a major expansion program involving ethylene, ethylene glycol, ethylene oxide and other petrochemicals.

Appointed To Sales Post

► Walter J. Tanner has been appointed to the eastern regional sales force of the Organic Chemicals Division of the Witco Chemical Co., with headquarters at Witco's New York office. Mr. Tanner, who has been associated with Witco for seven years, was previously an ink research chemist for 13 years. Mr. Tanner attended Pratt institute and Columbia University. He is a member of the New York and Philadelphia Printing Ink Production Clubs, the Paint, Plastics and Printing Ink Division and the Rubber Division of the American Chemical Society.

General Tire Wins Award

► Department of Defense conferred the "Reserve Award" on General Tire & Rubber Co., Akron, Ohio, on June 12 for "outstanding cooperation with reservists and reserve activities achieved through the personnel policies" the company has established. Rear Admiral H. H. Caldwell, chief of the Naval Air Reserve training program at Glenview, Ill. made the presentation to president William O'Neil on behalf of Secretary of Defense Wilson. Admiral Caldwell cited General Tire's policy in regard to reservists as "an outstanding example of employer cooperation with the Armed Forces Reserve components". Admiral Caldwell continued to say that the General Tire policy had contributed greatly toward the success of the Naval Air Reserve training program and expressed the hope that the example set by the company would be followed by other organizations in the area. In addition to the framed citation, General Tire also received the Reserve Training Pennant, which will be flown from the administration building.

Visits Rubber Centers

► Collier W. Baird, Jr., a vice-president of the Baird Rubber & Trading Co., Inc., is on a three month visit to the important rubber growing and trading centers in the Far East. He will visit Indonesia, Malaya, French Indochina, Ceylon, Thailand, Singapore, important Philippine Island accounts, company associates in Bombay and Karachi, London and Amsterdam.

New Nopco Plant Designed To Meet Growing Urethane Foam Market

► Nopco Chemical Co., celebrating its 50th anniversary as a major producer of industrial chemicals, has formally opened its new plastics plant in North Arlington, N. J. The new plant is said to be the first in the east to be devoted solely to research and production of urethane plastic foams. Ralph Wechsler, president of Nopco, in his welcoming remarks to guests attending the ceremony said, "This plant represents the first major step in Nopco's expansion into the plastics field. As the market for these versatile foams grows, we expect to grow with it . . . expanding our facilities and our areas of investigation as the need arises."

Featured exhibit at the new plant was a demonstration of the company's newly developed machine that makes possible assembly-line metering, mixing, and dispensing of pour-in-place foams. In discussing the machine, called the "Nopcometer," George G. Stier, vice-president in charge of the Plastics Division, said, "Our development of the Nopcometer should help bring about the tremendous estimated future use of urethane foams. A demand of 300 million pounds is possible, he said.

Government Will Not Appeal Court Decision on FTC Order

► The Department of Justice has decided not to appeal to the Supreme Court a lower court decision invalidating a Federal Trade Commission order limiting discounts on bulk purchases of tires to single-carload orders. Victor R. Hansen, Assistant Attorney General in charge of the Anti-Trust Division, made this statement in a letter to George J. Burger, vice-president of the National Federation of Independent Business. Mr. Burger had been urging the Department of Justice to appeal.

The decision of the Federal Court of Appeals in Washington, D. C., was announced on February 28. It set aside an order of the FTC, placing a quantity limit for discount purposes on tires and tubes made of natural or synthetic rubber of 20,000 pounds, or the weight of a carload, ordered for delivery at one time. The commission's order was issued in 1951. Major tire manufacturers fought the order as "arbitrary and capricious". They claimed it was not based on actual findings and that they were denied procedural rights when the rule was made.

The Appeals Court held that it was justified in setting aside the order because the FTC had not made a formal finding that "available purchasers in quantities greater than carload lots are so few as to render differentials on account thereof unjustly discriminatory or promotive of monopoly."

The Federation, of which Mr. Burger is an official, instituted the proceedings that led to the issuance of the FTC order ten years ago. He urged that the Appeals Court's decision be taken to the Supreme Court, contending it was important to small business that the order be upheld. Mr. Burger claimed that "the decision to drop the proceedings in this major case is like taking X-ray treatments away from the cancer victim and allowing the monopoly growth to continue to increase."

The next step, Mr. Burger said, would be to press for enactment of a bill pending in Congress that would prohibit manufacturers of tires from operating in the retail field. Unless this is done, he asserted, "there can be no future for independents" in the tire distribution field. Mr. Burger said that Senator Hubert H. Humphrey, (Dem., Minn.) chairman of the Subcommittee of the Select Committee on Small Business, had promised to hold hearings on the bill.

► Rochster Dairy Cooperative, a Minnesota dairy, has realized savings of six-tenths of a cent a gallon in packaging, handling and shipping liquid ice cream mix by using strong, lightweight bags made from film of Bakelite polyethylene encased in corrugated cartons.

► F. P. Bartlett & Co., Inc. has moved into a new plant located at 130 Jackson St., Canton, Mass., in order to expand manufacturing facilities and increase the company's Research Department. The new telephone number is CAnton 6-2480.

Henry J. O'Neil

Francis E. Klemm

Thiokol Chemical Names Two Technical Representatives

► Thiokol Chemical Corp., Trenton, N. J., has announced the appointment of Henry James O'Neil, as technical sales representative in the Detroit area, and Francis Edward Klemm, as technical sales representative for polyurethane resins. Mr. O'Neil, who will cover Ohio, Michigan and Indiana, has been in the chemical industry for almost nine years and was formerly associated with Gates Engineering Co., Wilmington, Del. He obtained a B.S. in chemistry at St. Bonaventure University in Olean, N. Y. Mr. O'Neil is a member of the National Association of Corrosion Engineers. Mr. Klemm, who has been in the chemical industry for almost 11 years, was formerly employed by the Kelite Corp., Berkeley Heights, N. J., where he handled technical sales service in the New Jersey area. Prior to this, he was associated with Jones-Dabney, Newark, N. J., and Sherwin-Williams. He received an A.B. in chemistry at Rutgers University and is now working on his M.S. in chemistry at the Newark College of Engineering, Newark, N. J.

Dewey & Almy Names Three

► Three new sales representatives have been appointed for the Organic Chemicals Division by the Dewey and Almy Chemical Co., Cambridge, Mass., a division of W. R. Grace & Co. Cornelius F. Sulliven, formerly with the Plastics Division of Dow Chemical Co., will handle the New England area from the company's Cambridge office under John G. Broughton, eastern sales manager. Mr. Sullivan was graduated from Boston College in 1950 with a B. S. degree in chemistry. Amos J. Miner, will serve at the Chicago office under midwest sales manager, William A. Morton. The recipient of a B. A. degree in chemistry from Wesleyan University, Mr. Miner was associated with the J. T. Baker Co. in sales and market research for seven years. James H. Aungst, to be located in Atlanta, Ga., will serve South Carolina, Georgia and Florida. Mr. Aungst, a graduate of Toledo University in 1951 with a B. S. degree in chemistry and biology, had been with Darling & Co. for three years and Merck & Co. for two years. Oscar W. Kaalstad, formerly in that territory, will transfer to the company's San Leandro office in California.

► Pennsylvania Credit Union League has announced that the employees of the Aldan Rubber Co. have organized their own credit union, the A. R. C. Philadelphia Federal Credit Union.

Nichols Joins Taylor

► Nathaniel B. Nichols, a former director of research for Taylor Instrument Companies, Rochester, N. Y., has rejoined the organization after an absence of several years. Mr. Nichols has been named chief engineer to succeed Ralph E. Clarrige, who has been appointed to the president's staff as specialist for new product lines. Mr. Nichols left Rochester to become professor of electrical engineering at the University of Minnesota. He subsequently joined the Raytheon Manufacturing Co., Waltham, Mass. as assistant vice-president and manager of commercial engineering. During the War, Mr. Nichols was called to the Massachusetts Institute of Technology to work in the Servomechanisms Laboratory and later as group leader of the Fire Control Division of the M. I. T. Radiation Laboratory where he worked on automatic radar tracking and fire control computors. Mr. Nichols is well known among instrument men through his writing and appearances before scientific societies. He is 1957 vice-chairman of the Gordon Research Conferences in Instrumentation and is also an active member of many scientific organizations.

► Chas Pfizer & Co., Inc. has developed a new sterile package utilizing Bakelite polyethylene for bulk shipment of antibiotics, which consists of two polyethylene film bags, one sealed within the other.

12th Foundation Lecture Delivered by Buist

► "Polymer Testing and Its Contribution to Developments in Industry" was the title of the 12th Foundation Lecture. It was delivered by J. M. Buist, of Imperial Chemical Industries, Ltd., on May 24 in Manchester, England. The Foundation Lecture is sponsored by the Institution of the Rubber Industry.

Mr. Buist said that much of the business of the rubber and plastic industries is based on the testing of materials. In the last seven years, between 500 and 600 new materials have been developed for the rubber industry and the rate at which new products are being developed appears to be increasing. According to Mr. Buist, the correct methods of test must be chosen to describe the properties of new material and results must be expressed in terms readily understood by all sections of the industry. Five testing subjects were discussed, representing different stages in the process of making test methods capable of accurate prediction of service behavior.

The variability of the De Mattia test has been reduced appreciably, Mr. Buist said, but still better reproducibility is required and, equally important, correlation studies between the De Mattia test and many service applications are urgently required before any further major advance can be made.

Describes I.C.I. Apparatus

The speaker then described the I. C. I. ozone exposure apparatus and a new dynamic test based on the De Mattia test, but employing a modified test piece. Mr. Buist believes that good correlation is obtained between outdoor De Mattia tests and a De Mattia machine enclosed in ozonized air in the laboratory. These test methods provide industry with a simple means of assessing static ozone cracking and dynamic ozone and atmospheric cracking.

Discussing a third test, Mr. Buist said that through the use of the power law relationship, $y = ax^n$, accurate prediction of service wear of many types of rubber articles have been made and results between different laboratory machines can be correlated. He then discussed color testing, light aging and testing of cellular products.

Concluding his talk, the author discussed development work and gave examples where the provision of correct test data has facilitated the development and entry of materials into new fields of application. Mr. Buist believes that periodic assessments should be made of the time between completion of development and actual production. He said that if implementation of research discoveries is to be improved, the position at each stage between initiating the research and starting production must be analyzed.

From a testing point of view, an analysis of this kind would reveal more exactly where existing test methods had succeeded in providing data in an appropriate form and also where further research and development work had been necessary because existing test methods could not provide data sufficiently precise for safe predictions of the technical outcome of the development to be made. He felt that an analysis of the position in this way would encourage a closer examination of the economic return from testing.

No matter how good test schedules appear to be, they can be further improved. Satisfaction with testing techniques and schedules will only come when there is a period of stagnation in the industry. Vigorous development in an industry ensures corresponding activity on testing since one stimulates the other.

The speaker closed by saying that as long as the present rate of progress in appreciation and understanding of problems involved continues, testing will make an ever increasing major contribution to development work.

Attorney General Reports

In a report to Congress and the White House dated July 1, Attorney General Herbert Brownell, Jr., reported that the privately operated synthetic rubber industry appears to be developing satisfactorily in relation to the anti-trust laws. The Attorney General's report covered the year 1956 and was made in accordance with a directive from Congress which requires that such reports be made annually. "The synthetic rubber industry gives indications that a fully competitive status is slowly emerging, although there remain some factors of concern," Mr. Brownell said. He noted that the West Coast was still without as much competition as the government had originally hoped for in that area. However, he said, the full effect of the expansion of capacity in the industry has not yet become apparent.

Davis To Serve Out Term

► The U. S. Supreme Court ruled on May 27 in a 7-2 decision that Poncet Davis must serve out his sentence on a tax evasion conviction. Mr. Davis had contended that he had been wrongfully and illegally sentenced under the Government's Internal Revenue Code. He must now serve out an additional seven months before he will be eligible for parole. U. S. District Attorney, Sumner Canary, announced that when the high court decision reaches him, he will move to revoke Mr. Davis' bond of $25,000. This means that Mr. Davis, who is now in Akron General Hospital recovering from two operations, can be picked up at once and returned to prison. Whether he will be, will depend on his condition at the time, it is believed. The government is now pressing a separate civil action in U. S. Tax Court for the recovery of $738,000 in taxes plus penalties and interest, about $1,800,000 in all.

Rubber Chemicals Output Falls 6% in 1956

► U. S. production of all rubber-producing chemicals fell off six per cent in 1956, according to the U. S. Tariff Commission. The commission pointed out the decline in releasing preliminary statistics on U. S. production last year. The 1956 total was 167 million pounds, compared to 177 million in 1955.

Sales of rubber-processing chemicals amounted to 132 million pounds, valued at $81 million in 1956, compared with 143 million pounds, valued at $86 million in 1955. The decreased production and sales of these chemicals in 1956 resulted from the decrease in consumption of rubber in that year.

The output of cyclic rubber-processing chemicals amounted to 141 million pounds in 1956, compared to 148 million pounds in 1955. Sales of these compounds were 111 million pounds, valued at $67 million in 1956, compared with 121 million pounds, valued at $71 million in the previous year.

The production of acyclic rubber-processing chemicals, chiefly accelerators and peptizers, amounted to 26 million pounds in 1956, compared with 29 million pounds in 1955. Sales amounted to 21 million pounds, valued at $14 million in 1956, compared with 22 million pounds, valued at $15 million in 1955.

Mulach Wins RTA Golf Trophy

► Paul A. Mulach, former major league player and now a sales executive for the Baird Rubber & Trading Co., Inc., New York, N. Y., has won, for the second time in three years, the William T. Baird Trophy, golf championship of the Rubber Trade Association of New York. Mr. Mulach carded 79 at the Knollwood Country Club in Elmsford, N. Y., at the annual R. T. A. outing held on June 10. Champions since World War II are: 1946, William Rothschild (M. Rothschild); 1947, Frank Hahn (Hecht, Levis & Kahn); 1948, William Rothschild (M. Rothschild); 1949, Frank Hahn (Hecht, Levis & Kahn); 1950 to 1952, Robert B. Baird (Baird Rubber); 1953, Fred Pusinelli (Pusinelli); 1954, Frank Hahn (Hecht, Levis & Kahn); 1955, Paul A. Mulach, (Baird Rubber); 1956, Cur Hagers (Internatio-Rotterdam).

Hypalon Plant On Stream

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that a new plant for the manufacture of Hypalon synthetic rubber has gone into production at Beaumont, Texas, and as a result there will be a 15c per pound price reduction for the elastomer. Effective July 26, 1957, the price per pound of Hypalon will be reduced from 85c to 70c f.o.b., Beaumont. The new plant, which has a 15 million pound capacity, employs improved production techniques. Previously, Hypalon was produced on a limited scale at the company's Belle works near Charleston, W. Va.

Stiehler and Allen Address Connecticut Group

► The May 24th meeting of the Connecticut Rubber Group, held at Manero's Restaurant in Orange, Conn., featured addresses by R. D. Stiehler of the National Bureau of Standards and John J. Allen of the Firestone Tire & Rubber Co. Mr. Stiehler chose as his topic, "Significance and Value of the National Bureau of Standards to the Rubber Industry", while Mr. Allen spoke on "Significance and Value of the American Society for Testing Materials to the Rubber Industry."

In his talk, Mr. Stiehler described briefly the organization of NBS and its statutory functions. The speaker stated that perhaps the most direct service which NBS provides the rubber industry is in the preparation of standard samples for rubber compounding. At the present time, he said, 15 standard materials including two rubbers are available. About half of them are routinely used in synthetic rubber plants for quality control of production. They are beginning to be used in the carbon black and other industries.

The results of the work at NBS are either reported to the sponsoring agency or published in scientific journals. In the field of rubber and rubber products, he stated, NBS has published about 350 papers.

Mr. Allen, in his address, first described the history of ASTM and its present-day functions. He paid particular attention to the formation and activities of Committee D-11 on Rubber and Rubberlike Materials. He observed that any producer or consumer of rubber products or materials used in the rubber industry may refer problems to D-11. If they have a sufficiently wide interest, they will be referred to an existing subcommittee or task group and, in some instances, a new subcommittee can be formed.

The value of ASTM, he stated, is in its impartial system of check and double-check. When a Standard or Tentative Standard is published, it represents the thinking and work of a large group of qualified technical people. It has been reviewed at least three times in passing from the subcommittee to the technical committee to the society. Because of this system, he declared, these standards have the respect of industry.

Carpenter Named To Receive Goodyear Medal for 1957

► Arthur W. Carpenter, Akron consultant on rubber technology and former manager of the testing laboratories of the B. F. Goodrich Co., Akron, Ohio, will receive the 1957 Charles Goodyear Medal at the 132nd national meeting of the American Chemical Society, which will be held in New York on September 12, 1957. The highest honor in rubber chemistry, the Goodyear Medal is conferred annually by the society's Division of Rubber Chemistry "to stimulate interest in fundamental research in rubber and to honor those who have performed outstanding service to rubber science".

Arthur W. Carpenter

Mr. Carpenter is well known in the rubber industry for his research and his contributions to the development of scientific apparatus for testing rubber and rubber products. Born in Wellsville, N. Y., he was graduated from the Massachusetts Institute of Technology in 1913 and also received a Master of Science degree there the following year. He became city chemist in charge of the water purification plant in Alliance, Ohio and after two years became assistant superintendent of the Akron, Ohio water purification plant. In 1918, he joined the United States Army, serving as captain in the Sanitary Corps in France.

After the war, Mr. Carpenter joined the Goodyear Tire & Rubber Co., Akron, Ohio, as a rubber technologist and rubber compounder and later he became associated with the Holtite Manufacturing Co., Baltimore, Md., serving as factory superintendent. Mr. Carpenter joined B. F. Goodrich as development engineer in 1927 and served as manager of the Goodrich testing laboratories from 1928 until his retirement in 1955.

During World War II, Mr. Carpenter worked with the government, on loan from B. F. Goodrich, as consultant to the War Production Board and assistant director for raw materials of the National Security Resources Board. In these capacities, he took an important part in the rubber conservation program and in guiding the utilization of synthetic rubber. Later, he received the NSRB Distinguished Service Award in recognition of his outstanding contributions to the work of the board, during the war years, and his devotion to the welfare of the country.

Mr. Carpenter has been active in the administration and committee work of the American Society for Testing Materials since 1928 and was president of the society in 1947. He has served as chairman or a member of more than thirty of the society's committees and subcommittees on rubber, plastics, methods of testing, scientific publication, quality control of material, ultimate consumer goods and Army Ordnance. He is also a fellow of the American Institute of Chemists and an active member of the American Chemical Society, the American Institute of Chemical Engineers and the National Society of Professional Engineers.

Plan International Symposium

► The International Symposium on Macromolecular Chemistry has been scheduled to take place in Prague, Czechoslovakia from September 9 to 15, 1957. The symposium will be held in two sections. The first section will deal with Physics and Physical Chemistry of Macromolecules, while the second will deal with Polyreactions. The organizing committee will arrange for simultaneous translation of communications and discussion into English, French, German and Russian. Further information may be obtained by writing to the Organizing Committee, International Symposium on Macromolecular Chemistry, 5 Technicka, Praha 6, Czechoslovakia.

KA-VU Rubber Repair Agent

► "KA-VU Cold Vulcanizing Paste", a new product for the repair of damaged rubber products has been introduced in the United States and Canada by Richard J. Kern, New York, N. Y. Imported from Switzerland, KA-VU is said to become an integral part of repaired articles without the use of patches or special equipment. According to the company, application is easy; repairs stay airtight and waterproof; it will not dissolve in hot or cold water or weather; it is heat and acid resistant as rubber and remains highly elastic. Articles repaired with KA-VU are said to regain their original usefulness and may be used like new.

Belt Rebuilding Service

► Based on successful experience in the Mesabi Iron Range, a new national service for repairing and rebuilding large conveyor belts has been announced by Conveyor Belt Service, Inc., of Virginia, Minn. Belts costing $5 to $100 a foot have been successfully rebuilt and returned to service in good condition, after end-to-end rips, transverse cuts, impact breaks, cover tears, and edge injuries have apparently headed these belts to the rubbish heap. "Very large savings are possible by rebuilding such belts," stated William A. Mars, president, "and our success on the Iron Range has now led us to offer this tested service on a national scale."

W. Raymond Ahrberg

Joins Columbian Carbon

► W. Raymond Ahrberg, formerly associated with the Barrett Division of Allied Chemical & Dye Corp., has been named technical sales representative for the Carbon Black & Pigment Division of the Columbian Carbon Co., New York, N. Y. A native of New York City, Mr. Ahrberg was graduated from the University of Toledo in 1939 with the degree of B. S. in chemistry. After graduation, he joined the De Vilbiss Co., serving until 1953, with the exception of three years Naval duty in the American, European and Pacific theatres during World War II. Mr. Ahrberg succeeds William E. Ford, who has been transferred to technical service. Mr. Ford, who will continue in Akron, succeeds Alden H. Davis, newly appointed resident technical service manager in Sao Paolo, Brazil, for Companhia Petroquimica Brasileira-Copebras, a joint enterprise of Columbian with Celanese Corp. of America, Traders, Inc. and Brazilian interests.

Hetchler Named Manager

► John D. Hetchler has been appointed to manage the new Chemical Division of Werner G. Smith, Inc., Cleveland, Ohio. The new division will be located in Cleveland and will manufacture new products, expanding the company's present line of sperm whale oils, fish oils and core oils. A chemical engineer, Mr. Hetchler has a background of 21 years in the fats and oils industry. He started as a chemist with the Wyandotte Oil and Fat Co., serving as assistant plant manager and as manager of sales and technical service for the New York area. Later, he was named chemical director. Most recently, Mr. Hetchler was sales manager of the Chemical Products Division of Archer-Daniels-Midland Co.

Appointed Technical Director

► Charles Aust has been promoted to technical director, a newly created post, for the Goshen Rubber Co., Goshen, Ind. Louis Rhodes has been named to succeed Mr. Aust as chief chemist.

GSA Reports On Stockpile Profits

The General Services Administration reported a net operating profit of $13,866,360.94 on its operation of the natural rubber security stockpile program between December 29, 1950 and December 31, 1956. The report submitted by Administrator F. G. Floete to the Congressional Joint Defense Committee placed a total value of $866,137,971.31 on the natural rubber inventory as of the end of the period. The gross operating profit accumulated on the rotation and up-grading sale of stockpile rubber to industry in this period was $23,712,256.31. Operating expenses in the rubber program trimmed this by $9,721,416.78, the report showed.

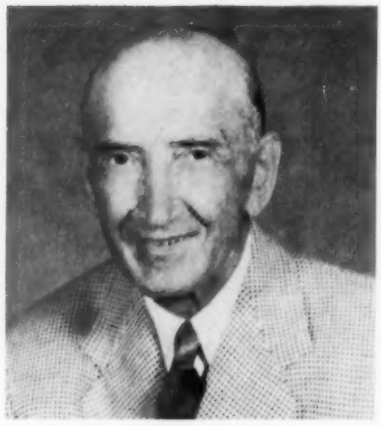
Over-all, the security stockpile program as administered under the Defense Production Act of 1950, amended, showed a net operating loss of $163,299,587.83. The report showed a net operating profit of $1,105,554.67 on the machine tool program. The big deficit items were in the minerals and metals programs which showed a net operating loss of $101,490,495.01. The other big element in the deficit was an item of $76,781,308.43 under the heading of such "undistributed" expenses as administrative, annual leave, custodial, interest, etc.

Heads United Carbon

► Richard W. French, Jr., has been elected president of the United Carbon Co., Charleston, West Va., succeeding Thomas A. Whelan. Mr. Whelan, a co-founder of the company, will continue as treasurer and will also be chairman of the executive committee. Mr. French was formerly associated with the Standard Oil Co. of Ohio as vice-president in charge of production and has been in the petroleum industry for more than 25 years. Although he has concentrated primarily on the exploration and production of oil, gas and related products and chemicals during his career, Mr. French has also had experience in the pigments and chemicals fields and research with General Electric Co. and Continental Oil Co. as well as with Standard of Ohio. Mr. French studied mechanical engineering at the University of Delaware, graduating in 1929, and later had graduate training in advanced engineering and business administration at the University of Southern California and Harvard University.

Two Bulletins Released

► Bulletins 51X8581 and 51X8582, entitled "How to Make a Motor Go . . . and Go, and Go, and Go", and "How to Take Step Seven", have been released by Allis-Chalmers Manufacturing Co., Milwaukee, Wisc. The bulletins cover the stories of two twenty minute, 35 mm, colored sound slide films which were released last December.



Herman Muehlstein

Receives Honorary Degree

► Herman Muehlstein, president of H. Muehlstein & Co., Inc., New York, N. Y., has been awarded an honorary degree of Doctor of Humane Letters by the University of Akron. Mr. Muehlstein was one of three men to be honored at the University's ceremonies. Raymond C. Firestone, president of the Firestone Tire & Rubber Co. and General Curtis Le May, chief of the Strategic Air Command have been awarded honorary degrees of Doctor of Law. Mr. Muehlstein's degree was awarded in recognition of his "notable contributions to the welfare of his fellow men". His many philanthropic activities included the Herman Muehlstein Foundation, Inc., a fund for the education of underprivileged youths in the New York area.

Improves Super Service Tire

► Seiberling Rubber Co., Akron, Ohio, has announced the addition of nylon to its "Super Service" passenger tire. All but one model of passenger tire made by the company is now manufactured with a choice of nylon cord construction. The exception is a mud and snow tire, not normally subjected to the highway heat conditions which make nylon's properties of resilience and heat resistance desirable. "Stop slots" have been added to the tire to improve traction, the white sidewall has been narrowed and sidewall bars relocated for greater protection against scuffing. The tire is available with rayon cord as well as nylon cord construction and is manufactured in a choice of black or white sidewalls in either the nylon or rayon versions.

New Construction Underway

► Heyden Newport Chemical Corp., New York, N. Y., is constructing a new plant at Pensacola, Fla., to produce methyl isopropyl catechol, a new turpentine based chemical, said to be a low-cost, highly efficient stabilizer for synthetic rubber manufacture. Scheduled for completion in October, 1957, the new facility will have a projected capacity for 500,000 pounds and will utilize an exclusive process developed by Heyden Newport research.

Butadiene Production Reaching Million Ton a Year Mark

► Current reports indicate that production of butadiene in the United States in 1957 may reach the million ton a year mark. On May 23 and 24 Texas Butadiene and Chemical Corp. held a two-day ceremony dedicating its $30,000,000 plant, which has been under construction for eighteen months. The plant has been producing chemicals since last December. The rated capacity of the new unit is 64,000 tons of butadiene and 100,000,000 gallons of blended aviation gasoline a year. President Eugene L. Greene forecast at the ceremonies that the plant would be expanded within five years and that its production might become more diversified. Principal owners of Texas Butadiene are Godfrey L. Cabot, Inc., Boston, Mass., and Carl M. Loeb, Rhoades & Co., New York, N. Y. Company officials said that construction of this plant marks the first time in history that a process and a plant have been put together to make butadiene and aviation gasoline directly from butane hydrocarbons. The Houdry Dehydrogenation process is utilized.

Late in May, Firestone Tire & Rubber Co., Akron, Ohio, started operations in a $10 million, 40,000 ton a year plant at Orange, Texas. Also close to completion are a 45,000 ton a year butadiene plant at Houston, Texas, built by Petro-Tex Chemical Co., and the Borger, Texas, plant to be operated by the Phillips Chemical Co., which is slated to turn out an additional 25,000 tons a year. Later, Odessa Butadiene Co. will start operations at its Houdry Dehydrogenation unit, producing an additional 50,000 tons ayear. Early next year, Neches Butane Products, jointly owned by the Texas-U. S. and Goodrich-Gulf combination, will expand its present capacity of nearly 200,000 tons to about 300,000.

Develops Hyprin GP25

► "Hyprin GP25", a new plasticizer and chemical intermediate, developed by the reaction of glycerine and propylene oxide, has been introduced by the Dow Chemical Co., Midland, Mich. The material is a new form of hydroxypropylglycerine, a viscous, yellowish-amber liquid and has an average addition of 2.5 moles of propylene oxide to each mole of glycerine. According to the company, the process and product are unique in that there is no polymeric build-up of the propylene oxide. The product is in use as a plasticizer in some cellulosic fields, the company says. Research indicates that it has less effect on lowering tensile strength of cellulosic products than glycerine or propylene glycol. Less volatile than glycerine, the new chemical has greater permanence on aging the company says. It is also less hygroscopic than glycerine and products in which it is used should have better dimensional stability. Applications under study are those where glycerine, glycols or sorbitol are now in use. Other possibilities are as a plasticizer, in cellulose film, in food packaging, etc.

Several Appointments Announced at Electric Auto-Lite

► Francis J. Oberhausen, formerly chief engineer of the Acme Wire Corp., has joined Auto-Lite Wire and Cable Division of the Electric Auto-Lite Co. at the Port Huron, Mich. headquarters as administrative assistant to F. H. Wetzel, chief engineer of the division. Mr. Oberhausen, a veteran of 27 years in all phases of wire and cable production, research and development will aid in an intensified research and development program for the division. Robert A. Barker and N. B. Cawthorne have been named section engineers in charge of specialized research and development areas and H. W. Borgman, project engineer, all at Port Huron. At the Hazleton plant, Leo O. Ravina has been appointed resident engineer.

Mr. Oberhausen holds a B. S. degree from Purdue University in electrical engineering and first entered the wire and cable industry in 1930 as a coil and magnet wire engineer. Since that time, he has progressed through posts of increasing responsibility in the industry. At New Haven, previous to joining Auto-Lite Wire and Cable, Mr. Oberhausen was president of the Industrial Management Club. He is a member of the National Electrical Manufacturers' Association, the American Society for Testing Materials and the American Standards Association.

Mr. Cawthorne and Mr. Barker are natives of Port Huron and both attended Port Huron Junior College. Mr. Cawthorne returned to Port Huron from the Hazleton wire and cable plant, where he has been resident engineer since 1950. A graduate of the University of Michigan with a B. S. degree in electrical engineering, he first joined Auto-Lite in 1933. In his new post, he will be in charge of products design, specifications and out-plant engineering.

Mr. Barker's new post is section engineer in charge of materials research and developments and the Auto-Lite wire and cable laboratory at Port Huron. He is a member of the Society of Automotive Engineer's ignition subcommittee.

In his new post as project engineer, Mr. Borgman will be responsible for plastic insulated wire research and development. He holds a chemical engineering degree from Iowa State College and is a member of the American Chemical Society and the Society of Plastics Engineers.

Mr. Ravina, who has been with Auto-Lite at the Hazleton plant since 1952, is a civil engineering graduate of Pennsylvania State University. Prior this appointment, he was assistant resident engineer. Mr. Ravina has worked as a specifications engineer and as a time study engineer at the Hazleton plant.

F. B. Williamson, Jr.

F. B. Williamson, 3rd

F. B. Williamson 3rd Elected President Of Goodall Rubber

► F. B. Williamson 3rd, executive vice-president of Goodall Rubber Co., Trenton, N. J., has been elected president of the company, succeeding his father, F. B. Williamson, Jr., who has been named chairman of the board. The elder Mr. Williamson joined the company in 1911 and, almost immediately open a branch for the company in New York City. During World War I, he served as a captain in the Coast Artillery Corps of the United States Army. He was elected president of Goodall in 1923. The new president, who joined the company in June, 1940, was elected a vice-president in March, 1949 and executive vice-president in March, 1954. During World War II, he served as a first lieutenant in the Fifth Armored Division and was awarded the Bronze Star Medal. Mr. Williamson is president of the New Jersey Rubber Manufacturers Association.

Dayton Acquires Cadillac

► Dayton Rubber Co., Dayton, Ohio, has acquired 99 per cent of the stock of the Cadillac Plastic & Chemical Co., Inc., Detroit, Mich., and four associated companies, according to a joint statement by A. L. Freedlander, president of Dayton, and Robert B. Jacob, president of Cadillac Plastic. Cadillac Plastic will retain its corporate name and will continue to operate under present management and personnel as a wholly-independent subsidiary. There will be no change in the subsidiary operating policies, the companies state. Mr. Freedlander noted that the acquisition of Cadillac Plastic carries Dayton Rubber further into the chemicals and plastics areas, in which the company expects sharp growth. Stating that Cadillac Plastic has pioneered in bridging the distribution gap between materials, supplier and end user, Mr. Freedlander added "Cadillac's distribution, know-how and organization will also help Dayton Rubber to expand sales in the chemicals and plastics field at a more rapid rate and assure us a competitive position in the introduction of new products." Cadillac stock was acquired in exchange for 77,500 shares of Dayton common, final quotation of which amounted to $1,724,375 on June 18.

Michael W. Huber

New Huber President

► Hans W. Huber was elected chairman and Michael W. Huber, president, of the J. M. Huber Corp. at the annual meeting of the board of directors held recently in New York City. Hans W. Huber has been with the company since 1918, and president since 1933. Michael W. Huber joined the company in 1949. He is a graduate of Princeton University.

Fort Wayne Holds Outing

► The Fort Wayne Rubber and Plastics Group held its sixth annual golf outing on June 7 at the Tippecanoe Country Club, Leesburg, Ind., with approximately 285 members and guests in attendance. A lobster and roast beef dinner was served and door prizes awarded. In the golf tournament, low gross honors were won by Richard Rieger (Bakelite). Mr. Rieger won the golf trophy presented by the Goshen Rubber Co. and another presented by the Jasper Rubber Co. John Gordeon (G-E) was runner-up. The prize for the longest drive was won by Morris Keyser (Rohm & Haas), and the prize for closest-to-pin went to Robert Kann (Goodyear). Runner-up in this category was Walt Wilson (R. T. Vanderbilt).

Other golf prizes were awarded to: Ray Mitchell (Extruded Plastics), Norm Rose (Triangle Rubber), Don Zimmerman (U. S. Rubber), F. Steitz (J. M. Huber), Dan Lamb (Oakite Products), Dan Chovan (Witco Chemical), William Poure (U. S. Rubber), Don Wogoman (Mogul Rubber), F. Frost (Frost Rubber), Cal Ihrcke (Kitco Engineering), William Harrison (General Tire), Cal Yoran (Brown Rubber) Russ Kurtz (DuPont), and William Johnson (Goshen Rubber). The Outing Committee included: John Porter (H. Muehlstein), chairman; and John Lawless (DuPont), Jack Lippincott (Dryden Rubber), Ed Theall (Dryden Rubber), Charles Cougill (Auburn Rubber), Stan Shaw (Witco Chemical), William Poure (U. S. Rubber), Al Robinson (Harwick Standard), Tom Saputo (Latex Compounders), and Howard Cantwell (U. S. Rubber).

New York Holds Outing

► More than 200 members and guests of the New York Rubber Group attended the Annual Summer Outing held on June 6 at Doerr's Grove, Milburn, N. J. The day was marked by pleasant weather and almost all of those attending participated in one or more of the planned activities. Robert E. Carroll (R. E. Carroll) served as chairman of the Outing Committee. He was assisted in the events noted by the following: *Softball,* A. Gessler (Esso Research); *Darts,* Dick Glidden (Ames Rubber); *Baseball Throw,* Ralph Ambrose (Rodic Rubber); *Basketball Throw,* Roy Benfer (Dow Corning); *Horseshoes,* Bill Lamela (Okonite); *Boccie,* Ken Chester (C. P. Hall); *Golf,* George Wyrough (Wyrough & Loser). The softball game was won by the team headed by Jack Briggs (Esso Research). G. Serniak (Esso Research) won the darts contest, while Miles Olsen (Niagara Rubber) took second place. Joe Maguire (Zerillo Products) won the basketball throw, and A. G. Zerillo (Zerillo Products) won the baseball throw. Mr. Lamela won the horseshoes contest with O. B. Samlen (R. T. Vanderbilt) coming in second. The team of R. J. Reale (Pitt-Consol) and Bill Hartman (Laurie Rubber) won the boccie contest. Ernie Holstrom (American Biltrite) took top honors in the golf contest. Food, beer and soft drinks were furnished during the day and this was climaxed by a chicken and corn dinner.

"Making" A Tire In Rockefeller Center

► Demonstrator points to miniature tire in small-scale, Bag-O-Matic press at exhibit hall of the U. S. Rubber Co. in Rockefeller Center, New York, N. Y. Drum-like object at right of press is an uncured 14-inch tire. Tiny Bag-O-Matic press is replica of large presses used by the company to shape and cure a raw tire in one operation. It is one of several educational exhibits included in the new displays open to the public at the rubber company's permanent exhibit hall.

Senate Subcommttee Plans Investigation of FTC

► A Senate subcommittee plans to investigate the Federal Trade Commission and its work in the rubber industry. Hearings are expected to start this month. Senator John J. Sparkman, who heads the committee on small business, ordered the inquiry and assigned it to a subcommittee chaired by Minnesota Democrat Hubert Humphrey. Mr. Sparkman said he was interested in the "complete failure" of FTC to establish the quantity discount rule in the industry. The Justice Department decided recently to drop the long government attempt to limit bulk discounts to single carload lots.

FTC ruled in 1951 that a single carload discount was the largest a rubber company could give its customers. This would give small tire dealers a better chance of competing against chain stores and gasoline company outlets. Major tire companies claimed the FTC order was "arbitrary and capricious." In February, the Federal Court of Appeals in Washington, D. C. set aside the FTC order. The Justice Department has decided not to appeal to the Supreme Court.

Senator Sparkman revealed the plans for investigation in a letter to George Burger, vice-president of the National Federation of Independent Business. Mr. Burger has filed charges with the committee, accusing FTC of failure to enforce the anti-trust laws.

Akron University Completes Second Elastomers Course

► University of Akron has completed its second annual intensive six-day course for scientists and engineers on "The Chemistry and Physics of Elastomers." Dr. Maurice Morton, professor of polymer chemistry and director of the University's Institute of Rubber Research, served as director of the course. Others in the faculty included Dr. G. Stafford Whitby, professor emeritus of rubber chemistry at Akron University; Dr. Kenneth W. Scott, section head of the Goodyear Tire & Rubber Co.; Dr. Fred J. Beuche, associate professor of physics at the University of Wyoming; Dr. James P. Berry, postdoctoral fellow at Akron University, and Howard L. Stephens, instructor in rubber chemistry at Akron University.

The course included 28 hours of lectures and 15 hours of laboratory work and consisted of a study of recent developments in Hevea latex, chemistry of synthetic rubbers, physical behavior of elastomers (elasticity theory, dynamic properties), physical behavior of elastomers (relaxation, tear, abrasion), physical behavior of elastomers (tensile strength, reinforcement), and chemistry of vulcanization.

Limited to 28 advanced scientists and engineers, more than a dozen applicants were turned away. They will be given preference in registering for the course next summer. Members of the class were: Edward Amann, Ohio Rubber Co.; Joseph C. Ambelang, Goodyear Tire & Rubber Co.; Deming E. Baker, Monsanto Chemical Co.; L. Breitman, Polymer Corp., Ltd.; Robert J. Brown, Goodyear Tire & Rubber Co.; Harry W. Cope, Richardson Co.; Charles M. Eaker, Monsanto Chemical Co.; G. T. Fitzpatrick, Playtex, Ltd.; H. Fudeman, Trico Products Corp.; John R. Haws, Phillips Petroleum Co.; John Henley, Ohio Rubber Co.; Carl Hopkins, Quaker Rubber Corp.; Ralph W. Jindrich, Richardson Co.; Glen F. Johnson, Goodyear Tire & Rubber Co.; George E. Levasseur, Stowe-Woodward, Inc.

Also Walter H. Maloney, Dewey & Almy Chemical Co.; Walter Mordarski, Connecticut Hard Rubber Co.; Robert M. Nelson, Dewey & Almy Chemical Co.; Robert C. Schulz, Nichols Engineering, Inc.; Harvey Scott, B. F. Goodrich Research Center; John L. Snyder, Shell Chemical Corp.; Curtis C. Steuber, Columbia - Southern Chemical Corp.; Clarence Svoboda, Ohio Rubber Co.; G. H. Swart, General Tire & Rubber Co.; G. E. Van Gils, General Tire & Rubber Co.; David E. Weacer, B. F. Goodrich Co.; Ralph F. Wolf, Columbia-Southern Chemical Corp.; Pascal Zapponi, Clevite Research Center.

► "Technical Data Sheet 111A" has been offered by Bacon Industries Inc., 192 Pleasant St., Watertown, Mass., to provide information on pre-weighed adhesive compounds FA-1 and LCA-1 for hermetic-sealing applications which are now available in one-shot packages. Write to Eldon Fay, sales manager.

Jack D. Lodge

J. Edgar Moe

Lodge and Moe Receive Promotions at Bullard Clark

► Jack D. Lodge has been named to succeed Edward J. Bullard as president and treasurer of the Bullard Clark Co., Danielson, Conn. Mr. Bullard was elected chairman of the board of directors at a recent meeting of the board. Formerly vice-president and secretary of the corporation as well as general manager of the Williamsville Buff Division, Mr. Lodge has been associated with the organization for more than 25 years. Other executive shifts include the promotion of J. Edgar Moe, general manager of Jacobs Rubber Division and former vice-president, to the post of executive vice-president and secretary of the Bullard Clark Co. The post of executive vice-president was formerly held by B. T. Clark, who has retired after 25 years service because of ill health. In addition to continuing as sales manager for the company's textile divisions, vice-president William R. Miller, has been named division manager of the E. H. Jacobs Northern Division.

Okonite Opens New Plant

► Okonite Co. has formally opened its third New Jersey plant for the manufacture of electric wire and cable. Located in North Brunswick, N. J., the mill is 1,400 feet long and 360 feet wide and was originally built by Studebaker to be used as an auto assembly plant. Later, it was sold to Volkswagen, a German auto company, and was subsequently purchased by Okonite for $4,205,000. After remodeling the plant, the company transferred machinery from its former operations at Wilkes-Barre, Penna., and added some $2 million worth of new machines. According to the company, about 70 per cent of its Wilkes-Barre employes, have moved to North Brunswick.

Named Assistant Professor

► Dr. James P. Berry, postdoctoral fellow in the Akron University Institute of Rubber Research has been appointed assistant professor of chemistry. Effective September 1, Dr. Berry will devote one-fourth of his time to teaching and three fourths to research in the Institute of Rubber Research. He received his B. S. and Ph. D. degrees from the University of London and has been a postdoctoral fellow at Akron since October, 1955.

Discuss Tire Yarn Advances

► Textile Fibers Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., presented new developments and techniques in tire yarn research to 200 representatives of 18 rubber companies, yarn processors and equipment manufacturers on May 8 at the Portage Country Club. According to the company, improved tire performance and economies have been made possible in recent years through cooperative research programs of tire manufacturers and DuPont. Dr. William F. McDevit, nylon research supervisor, in a talk on fundamental research, described the physical properties and structure of nylon tire cords. The present status of hot stretching nylon tire cord was summarized by Donald E. Howe, supervisor of DuPont's Industrial Products Research Laboratory. Dr. Willard W. Ransom, laboratory director for rayon research, spoke on the utilization of higher strength rayons while Dr. John M. Swanson, manager of DuPont's Industrial Products Research Laboratory summarized advances made in tire esthetics since the first technical review. Donald H. Heckert, tire merchandising supervisor, spoke on the reduction of cord content in nylon tires, emphasizing that a major industry objective in the last 15 years has been to reduce the cost of these tires.

Three Companies Merge To Form Amerace Corp.

► A merger and consolidation of the Bachmann Uxbridge Worsted Corp., American Hard Rubber Co., and the Wardell Corp., is being proposed subject to the affirmative vote of stockholders of the three companies at separate special meetings. All three boards have voted unanimously to recommend the merger to their respective shareholders. The name of the resulting corporation will be Amerace Corp.

Preferred stock of American Hard Rubber and Bachmann Uxbridge will be exchanged share for share for similar preferred of the new corporation. Common shares will be exchanged for Amerace common by American Hard Rubber share for share by Bachmann Uxbridge nine shares for one share of Amerace; by Wardell one thousand shares for two hundred seventy five shares of Amerace.

The purpose of the proposed merger is to create a financially strong and well balanced business enterprise equipped to expand and diversify its activities in the areas of chemicals, plastics, hard rubber, battery components, chemical equipment, wire and cable in which American Hard Rubber Company is now engaged, and to compete successfully in the textile industry in which Bachmann Uxbridge now operates.

Bachmann Uxbridge is one of the largest producers of woolen and worsted and blend fabrics designed for men's and boys' clothing, women's wear, uniforms and automobiles. It operates six plants, employs 2300 persons, and had sales amounting to $33,134,933 in 1956.

American Hard Rubber manufactures and sells numerous products through six divisions. Products manufactured include battery parts, plastics pipe, chemicals, chemical equipment, wire and cable, bowling balls, combs, business machine keys, telephone dials, garden hose, lawn sprinklers, reclaimed rubber, compounds, and many other industrial products. American Hard Rubber is one of the largest independent manufacturers in each of its fields. It employs 2,297 persons, and had sales of $26,550,000 in 1956.

Since 1953 the assets of Wardell have consisted of funds equivalent to cash. These funds will approximate $5,000,000 at the time of the merger and will be available as additional capital.

Victor T. Norton, president of American Hard Rubber will be president of Amerace Corp., and chairman of the Executive Committee and chief executive officer; Harold J. Walter, president of Bachmann Uxbridge will be vice-president, and vice-chairman of the Executive Committee; Louis Bachmann, Jr., executive vice-president of Bachmann Uxbridge will be vice-president, as will be Newton H. Tuthill, vice-president of American Hard Rubber; Budd E. Pollak and Felix P. Juraska, secretary and controller, respectively, of American Hard Rubber and H. Nelson Flanders, Jr., treasurer of Bachmann Uxbridge will occupy the same positions in Amerace.

Releases New Specification

► Department of the Navy, Bureau of Ships, Washington 25, D. C., has released *Military Specification MIL-M-19863 (ships), April 25, 1957, Mount Resilient, Type 5B5000.* Also released is *Military Standard MIL-STD-297, Visual Inspection Guide for Hard Rubber (Ebonite) Items,* a visual inspection guide on various rubber products. The former is a new specification covering a synthetic rubber element, a resilient mount with a load capacity from 3,500 to 5,000 pounds. The resonant frequencies of this mount are five plus or minus one cycles per second in both the axial and transverse directions within the load range of 3,500 to 5,000 pounds. Awards will be made only for such mounts as have been tested and approved for inclusion in the applicable products list prior to the time set for opening of bids. Manufacturers should have mounts to be offered to the Federal Government tested for qualification so that they may be eligible for awards of mounts covered by this specification.

Recent DuPont Publications

► The Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced the availability of the following technical publications: "Neoprene Type WHV" (Report No. 57-1); "Neoprene Latex Type 635" (Report No. 57-2); "Neoprene Latex Type 750" (Report No. 57-3); "Neoprene Cellular Rubber" (Report No. 57-4); "The Zenites" (Report No. 56-7); "Thermoflex A" (Report No. 56-8); "NBC" (Report No. 56-9); "Flexibility in High Quality Neoprene Compounds for Exceptionally Low Temperature Service" (Report BL-319); "Neoprene vs. Neoprene/GR-S Blends—A Comparison of Equivalent Cost Compounds" (Report BL-320).

Goodyear "Natsyn" Synthetic Tested in Truck Tires

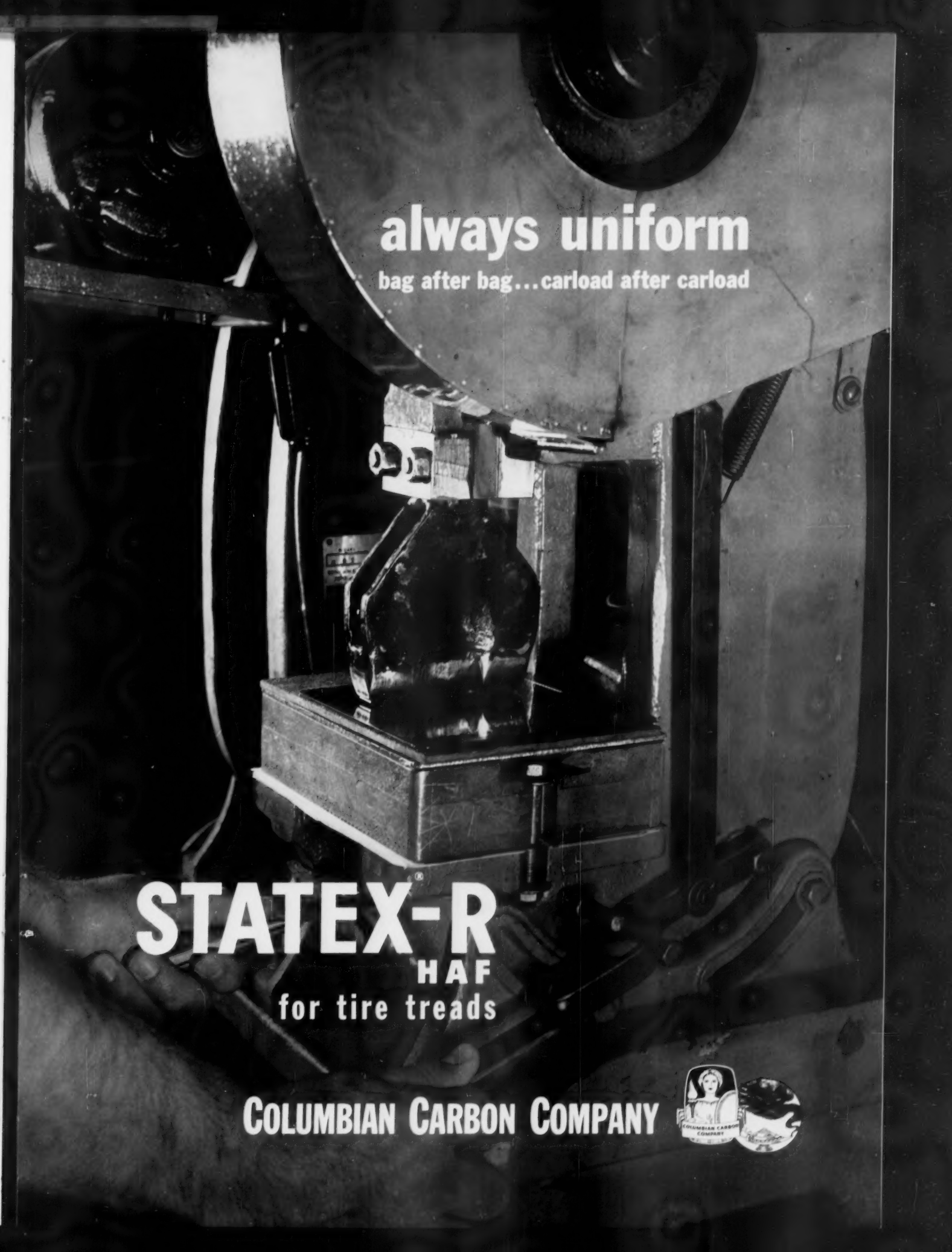
► A new type of synthetic, developed by the Goodyear Tire and Rubber Co., has been used for the manufacture of truck tires, which are said to have performed as well as natural rubber truck tires in a coast-to-coast highway test run conducted by the company. Designated "Natsyn," the new synthetic rubber was developed by Goodyear research scientists and has a molecular structure like natural rubber, according to the company. Goodyear officials said that the cross-country test was the first practical use of the new type of synthetic material in actual service conditions. The company believes that the successful performance of the synthetic material in truck tires removes a threat to America's trucking industry should natural rubber supplies be shut off. Further, it provides another bulwark against any threat of run-away natural rubber prices. While the new type of Natsyn rubber is now in the pilot plant stage, Goodyear officials foresee its gradual emergence into commercial production.

Syloid Gels Improve Adhesives

► Davison Chemical Co., Baltimore, Md., a division of W. R. Grace & Co., has announced that extensive tests have established the practicability of the use of the "Syloid" line of fine sized silica gels in the formulation of adhesives. The addition of 5 per cent of Syloid 75, an intermediate density gel, to the synthetic rubber solvent type adhesives increases bond strength from 85 to 2,000, the company says. Syloid 244, an aerogel, is also used in adhesives for thickening and increasing bond strength. Both materials are readily dispersed by stirring into the adhesive.

Firestone Rubber Air Spring Production Unit On Stream

► Firestone Tire & Rubber Co., Akron, Ohio, has completed construction of the rubber industry's first plant built solely for the production of rubber air springs at its Noblesville, Ind., industrial products factory site. The new Firestone structure (foreground) will house machinery for the production of rubber bellows for air suspension systems to be used on some 1958 model cars. The factory will begin volume production of "Airide" springs this month.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COLUMBIAN CARBON COMPANY
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George V. Lang

Named Vice-President

► United Engineering and Foundry Co., Pittsburgh, Penna., has announced that the board of directors, in addition to re-electing all incumbent officers, has elected George V. Lang as vice-president in addition to his present office of treasurer. Mr. Lang began his career with the company as a stenographer-clerk in 1909, advanced successively through the various accounting positions to become secretary and assistant treasurer in 1931, becoming treasurer and chief financial officer in 1935. Educated at Duquesne University, Mr. Lang is a member of the board of directors of the company and treasurer of each of its subsidiaries.

To fill the vacancy caused by the recent death of Mr. C. William Correll, the board elected Warren S. McKay as assistant treasurer. Mr. McKay has been employed by the company since 1942, most recently in the position of manager of its Tax and Insurance Department. N. J. Chavern was elected to the Company's Retirement Board and will act as its secretary. Mr. Chavern is supervisor of payrolls and employe benefit programs, and began his career with the company in 1936.

New MCA Officers Announced

► Manufacturing Chemists' Association, Inc., Washington, D. C., has announced the election of officers at the association's 85th annual meeting which was held on June 6 at White Sulphur Springs, West Va. Ernest Hart, president of Food Machinery and Chemical Corp., was elected chairman of the board of directors, and Harry B. McClure, vice-president of Union Carbide Corp., chairman of the executive committee. General J. E. Hull, USA (Ret.), was re-elected full time president and a director. R. L. Murray and D. S. Frederick were elected vice-presidents. Mr. Murray is chairman of the board of the Hooker Electrochemical Co. and Mr. Frederick is vice-president of Rohm & Haas Co. M. F. Crass, Jr., full-time secretary-treasurer, was also re-elected.

To Test Giant Coral Tires

► Giant synthetic rubber tires, consisting of 100 per cent Coral rubber, will be manufactured by the Firestone Tire & Rubber Co., Akron, Ohio, for testing by U. S. Army Ordnance. The new tires, the largest all synthetic tires the company has ever built—size 24.00-25, measure more than six feet tall and weigh half a ton. Coral Rubber is said to have all the desirable physical properties of natural rubber although it is not an exact duplication of natural rubber. It is superior to natural rubber in resistance to cracking and is more easily processed, the company says. The development of a synthetic that could be used for heavy duty truck tires has been one of the major goals of all rubber research scientists. Patent rights, research data and experimental quantities of the new rubber were offered to the Department of Defense and the rubber industry in August 1955 in an announcement by Harvey S. Firestone, Jr., the company chairman. Smaller tires made of Coral rubber, tested last year by the U. S. Army, were said to exceed all military requirements. The company believes that the successful development of this synthetic rubber may eliminate the need for stockpiling of natural rubber and might assure the nation of an adequate supply of tires for military purposes without resort to natural rubber in the event of a national emergency.

Super Service 100 Tire

► A new truck tire designed to perform at a low cost per mile has been developed especially for operators of small or medium sized fleets by the Seiberling Rubber Co., Akron, Ohio. Named the "Super Service 100", the new product, engineered with the stress on economy, now is in full production. The truck tire bears the name of another model formerly manufactured at Seiberling. Company officials expect the new version to outwear its predecessor by 30 per cent, however, because of its improved tread design and contour. "Tread on the Super Service 100 literally puts more rubber on the road," claims O. K. Feikert, manager of truck tire sales. "Its flatness from shoulder to shoulder increases road contact, thereby extending the life of the tread and durability of the tire. "Non-skid effectiveness also is improved because of the deep, saw-tooth design of the tread," Mr. Feikert added. The new Super Service 100 is being produced in sizes from 8.25-20 through 10.00-22 in rayon construction.

Expands Research Facilities

► Air Reduction Co., Inc., New York, N. Y., conducted ground breaking ceremonies on June 19 for the construction of a new, two story polymer laboratory costing over half-million dollars, at the site of the Murray Hill Laboratories in Murray Hill, N. J. The new unit will house additional chemical research facilities and will be devoted to the development of polymers. Completion is scheduled for the end of 1957.

Howard B. Smith, Jr.

Appointed Sales Engineer

► Howard B. Smith, Jr., has been appointed sales engineer in the Middle Atlantic area for the Process Equipment Division of the Rodney Hunt Machine Co., Orange, Mass. Mr. Smith will serve customers in southern New Jersey, eastern Pennsylvania, Delaware, Maryland and northern Virginia from offices in the Fidelity Philadelphia Trust Building in Chester, Penna. Mr. Smith received his B. S. degree in chemical engineering from New York University and did graduate work at Columbia University, New York University and Drexel Institute. He has been a design and test engineer with Babcock and Wilcox Co., a project engineer with Foster Wheeler Corp. and a sales engineer with the Downington Iron Works in New York City. Before joining Rodney Hunt, Mr. Smith was a process design engineer with United Engineers and Constructors, Philadelphia, Penna. He is a member of the American Chemical Society, the American Institute of Chemical Engineers and the American Gas Association.

Offers Light Aircraft Tire

► Firestone Tire & Rubber Co., Akron, Ohio, has introduced a new line of airplane tires, for light civilian airplanes, which are said to incorporate features developed and tested on high speed military jets. Constructed of nuclear controlled nylon, the new line consists of 12 tires ranging in size from 5.00-4 to 11.00-12. According to a company statement, the new nylon line incorporates all of the advantages of other types of tires as well as the added advantage of reduced weight. The line has survived burst-tests at three times rated inflation and the tires are constructed of heat resistant, long wearing compounds. Discussing the new line of civilian airplane tires, E. B. Hathaway, vice-president of Firestone's trade sales, said, "Many of the features built into these tires underwent far rougher usage in the air force than they will ever meet in civilian use. They contain the toughest, longest wearing tread stock known to science."

Southern Rubber Group Holds Two-Day Meeting

Atlanta Meeting Features Panel Discussions on "Latex" and "Antioxidants and Antiozonants"

► The Southern Rubber Group had some 250 members in attendance at its meeting on June 7 and 8 at the Dinkler Plaza Hotel in Atlanta, Georgia. Featured at the meeting were two technical panel discussions, one on "Latex," and the other on "Antioxidants and Antiozonants." A banquet for the members on the evening of June 7 was followed by an after-dinner speech by Warren Foster of the Coca Cola Co., and the presentation of the newly elected officers. R. B. Ehlers (Dow Corning) acted as master of ceremonies. A suppliers' hospitality room was open to members and guests before and after the banquet.

The new officers, who will assume their duties on November 1, 1957, are: *Chairman*, Thomas R. Brown (Goodrich); *Vice Chairman*, Warren Hall (Phillips Chemical); *Treasurer*, Monroe Mirsky (Guiberson); *Secretary*, Roger B. Pfau (C. P. Hall); *Directors* Albert Koper (Harwick Standard Chemical) and Robert Baker (General Tire), and *Hold-over Directors*, John R. Galloway (DuPont) and Robert W. Rice (Firestone). John M. Bolt (Naugatuck Chemical) who is now Chairman of the Group, will become a member of the Board of Directors upon the expiration of his term in November.

The panel which discussed "Latex" met on the afternoon of June 7, and included four speakers: E. Glymph (Firestone), who spoke on "Natural Latex"; J. P. McKenzie (Copolymer), who discussed "Styrene-Butadiene (GR-S Type) Latex"; R. R. Waterman (R. T. Vanderbilt), who had for his subject, "Latex Compounding," and E. Leonard Borg (Naugatuck Chemical), who reported on "Use of Latex in Textiles, Fibres and Paper." Moderator of the panel was J. L. Fesperman (Catherine Rug Mills).

Antioxidant Panel Members

The panel, which had as its subject "Antioxidants and Antiozonants", met on the morning of June 8. The speakers were: T. H. Newby (Naugatuck Chemical), who spoke on "Industrial Growth and Theory of Function"; D. E. Baker (Monsanto Chemical), who reported on "Use in Tires and Tubes"; J. C. Stewart and R. R. Waterman (R. T. Vanderbilt), who discussed "Use in Latex," (the paper was delivered by Mr. Stewart); A. R. Davis (American Cyanamid), who had as his subject "Use in Molded and Extruded Goods," and C. E. McCormack (DuPont), who spoke on "Use in Wire and Cable." Alfred E. Hoffman (Universal Oil Products) served as moderator.

Program Chairman of the meeting was Mr. Brown, assisted by Mr. Hall and W. J. Mohr (Southern Latex). The Housing Committee was composed of William F. Gerrow, Jr. (Goodyear Chemical), George N. Brunt (Southern Latex) and Edward J. Strube (Du Pont). The suppliers hospitality room was under the supervision of Mr. Koper.

Panel on Latex

In his report on "Natural Latex," which was the first address on the "Latex" panel, E. Glymph stated that in spite of the rapidly growing synthetic latex industry, the future outlook for natural rubber latex is bright. He accounted for the healthy position of the industry by advances in production, improvements in quality of the product and the desirable combination of properties in natural latex which has not been equalled in any of its man-made competitors. This combination includes good film forming qualities and high film strength, high elongation, high wet gel strength, good resilience and ease of processing and cure.

In discussing advances in production, Mr. Glymph noted the development of high yielding clones which produce 1500 pounds of dry rubber per acre and more. Research on yield stimulation by the injection or application of chemicals, particularly certain hormones, was also discussed, as were improvements in centrifuging.

Advances in sanitary handling, proper storage and development of preservatives were described by Mr. Glymph in his analysis of the improved quality of the natural latex produced today. The development of low ammonia type latices has been of great importance in improved preservative systems. Mr. Glymph stated that the future outlook for natural latex is promising because it has a combination of excellent properties which have not been equalled by its competitors, and because its present high quality and performance are continually being improved.

J. P. McKenzie in his talk on "Styrene-Butadiene (GR-S Type) Latex," outlined this history of the comparatively young synthetic latex industry. He described the procedures involved in the low temperature process for making synthetic latices, and then outlined the producers, properties and uses of the principal hot polymerized and cold polymerized latices available. The latter part of the address was concerned with problems in the production of high solids latex, and the effort now being expended to raise efficiency and to lower cost of production. He also presented information on resin-type styrene-butadiene latices, new latices and current production figures.

R. R. Waterman in his talk on "Latex Compounding," gave basic information on his subject, analyzing requisites of the proper stabilizer, and the use of the accelerator in controlling pre-cure. He then continued by discussing such subjects as fillers, softeners, and tackifiers. In regard to thickeners, he discussed physical form, compatibility, hydrolysis, flow characteristics, creaming and color. He concluded with a discussion of the problems of mixing, the machines needed for preparation of the ingredients, and the order in which the various ingredients are added.

In his talk, "Use of Latex in Textiles, Fibres and Paper," E. Leonard Borg stated that perhaps one hundred different latices are commercially used in applications in fibrous materials. The latices are generally tailor made to meet the specific requirements of the intended application. In textile applications, the problem is usually that of developing adequate adhesive strength at the fabric-film interface. Mr. Borg discussed desirable latices for different needs, making special mention of tire cord and back sizes for carpets and upholstery fabrics.

In regard to paper applications, Mr. Borg discussed beater addition, in which the latex is mixed with the beaten pulp, and saturation, in which the latex solids are incorporated into a paper web either on the paper machine or off. In the saturation method the web is passed through a bath of latex. He also described the application of functional and decorative coatings to paper from latices.

Panel on Antioxidants

The first speaker on the panel on "Antioxidants and Antiozonants," was T. H. Newby, who discussed, "Industrial Growth and Theory of Function." He briefly outlined the development of the antioxidant industry, from the time in 1870 when a man named Murphy recognized that rubber deteriorates from oxidation and suggested the use of phenols to retard the decay.

Mr. Newby then went on to outline the function of the antioxidant. He stated that the two culprits at the bottom of rubber deterioration are oxygen and ozone. He explained that oxidation of rubber is viewed as a free radical, autocatalytic chain reaction. In order to protect the rubber it is necessary to stop the chain reaction and to destroy any peroxides already present. The antioxidant, which stops the reaction, is itself gradually consumed in protecting the rubber. This mechanism explains why very small amounts of antioxidant, as low as .001 per cent, are able to protect the rubber for long periods of time, it being necessary only to interrupt the chain reaction at the beginning in order to hold down deterioration.

The mechanism of rubber deterioration by ozone is not as well proven as that of oxygen. Peroxides or iso-oxonides formed are not stable and will upon hydrolysis, or other types of decomposition, give chain scission. The protection of rubber is a matter of either preventing the initial formation of the ozonide, or of preventing the decomposition into fragments. The question as to which of these two mechanisms is the correct one remains yet to be answered.

D. E. Baker, in his talk on "Use in Tires and Tubes," traced the development of

the various materials used in rubber to give it desired characteristics until the time that it was necessary to make drastic improvements in the service life if progress was to continue. This led to the introduction of the first commercial antioxidant in 1924, a reaction product of aniline and acetaldehyde known as VGB. Since that time many thousands of organic materials have been synthesized and tested as antioxidants, and a large number of excellent ones are available to the rubber technician today.

Widespread failure occurred in many rubber articles about 20 years ago, and it was found that ozone in the atmosphere in different locations was attacking the rubber. This lead to the first commercially available antiozonant, Santoflex AW, available in 1950. Mr. Baker continued by listing the antioxidants and antiozonants available today for tires and tubes, and the uses of each depending on the type rubber and kind of tire.

J. C. Stewart delivered the address coauthored by him and Mr. Waterman on "Use in Latex." He stated that the antioxidant protection needs in latex are intensified because of the large surface area per unit weight found in many applications. The choice of antioxidants is limited by personal use, esthetic considerations and others.

He then continued with a discussion of chain scission, cross-linkage and side chain alterations, and the role of the antioxidant in protecting the polymer. In conclusion, the properties of the ideal latex antioxidant were listed, and comments made on materials currently being developed as antiozonants.

Offers Antioxidant Groupings

Arnold R. Davis, who spoke on "Use in Molded and Extruded Goods," placed the approximately 50 antioxidants used for these purposes into five groups: (1) Aldehydeamines, (2) Ketone-amine reaction products, (3) Secondary amines, including secondary aromatic amines and secondary alkyl-aryl amines, (4) Primary aromatic amines and (5) Phenols. He then listed the more common commercial antioxidants in each class, giving properties of each.

In his discussion of antiozonants, Mr. Davis described the use of microcrystalline petroleum waxes which form a film on the surface of the rubber product and thereby prevent the atmosphere from coming into contact with the rubber. Since these wax films are not flexible, however, they are of little value in products for dynamic service. He concluded with descriptions and uses of antiozonants which do react with the ozone to prevent cracking; Santoflex AW, NBC and dialkyl derivatives of p-phenylenediamine.

The last speaker on the panel was C. E. McCormack, whose topic was "Use in Wire and Cable." He stated that since cable insulations are normally protected by an outer covering, there is ordinarily no need for protection against atmospheric ozone or light energized oxidation. Protection against ozones generated by internal corona is required, however, in high voltage cable, and is provided in natural rubber and SBR insulations by using a large percentage of factice, and to a much lesser extent by antioxidants.

Mr. McCormack explained that it is customary to include one to three parts of selected antioxidants in natural rubber and SBR insulations. He continued by discussing the various antioxidants employed and characteristics of each. All of the neoprene consumed by the wire and cable industry is used in outer coverings. Due to the inherent resistance of neoprene to ozone, cracking from atmospheric ozone is not a problem with conventional good quality jacket compounds, which normally contain about two parts of antioxidant and three to four parts of selected waxes. Mr. McCormack continued by explaining the necessity for protection, however, against ozone generated by corona discharge, making recommendations as to antiozonants.

He concluded by saying that the wire and cable industry by using antioxidants and antiozonants in considerable quantity had improved cable performance. Because of the emphasis on long service life under increasingly severe conditions, the industry is receptive to all new materials which promise improved performance.

The papers presented by the panel on antioxidants and antiozonants appear elsewhere in this issue. The papers featured in the panel on "Latex" will appear in the August issue.

The next meeting of the Southern Rubber Group will be held at the Peabody Hotel, Memphis, Tenn., on November 15 and 16. The subjects of the two seminars to be presented at that time are "Rubber to Metal Bonding" and "Standard Quality Control and Rubber Grading."

S. W. McCune, 3rd

E. P. Hartsfield

DuPont Announces New Appointments for McCune and Hartsfield

► Samuel W. McCune, 3rd, Eastern District sales manager of the Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., has been named general sales manager of DuPont (United Kingdom) Ltd. E. Paul Hartsfield has been appointed sales manager of the Eastern District succeeding Mr. McCune. Mr. McCune will be headquartered in London and will be responsible for the overall sales activities of the new DuPont subsidiary, now building a neoprene plant near Londonderry, North Ireland. He has been Eastern District manager for the past two years and was assistant manager of the Development Sales Section in Wilmington prior to that. From 1951 until 1953, he was sales supervisor of the New York office. A graduate of Princeton University, he has worked in the company's rubber laboratory and as sales correspondent in Wilmington. Before joining DuPont in 1940, he was research assistant at the Mellon Institute of Industrial Research.

Assistant manager of the Eastern District since 1955, Mr. Hartsfield formerly was sales supervisor of the New York office of the Elastomers Division of the Organic Chemicals Department. The division became the Elastomer Chemicals Department in January of this year. He also has worked as a sales representative and in the Akron District Laboratory and has done sales service and development work at the department's Wilmington laboratory. A graduate of Emory University, he started with DuPont in 1940 as an analytical chemist at Jackson Laboratory, and was assigned to several DuPont plants before joining the elastomers sales group.

Cycolac Prices Reduced

► Marbon Chemical Division of the Borg-Warner Corp. has announced price adjustments for Cycolac. The new prices, effective July 1, provide substantial savings from 5c per pound in the powder form to 7c per pound for the pellets. The company said that the new prices reflect the tremendous growth and popularity of Cycolac resin since its introduction, a little over three years ago. The increased demand, coupled with greatly expanded manufacturing facilities, has enabled the company to effect economies in production.

ASTM Committee D-11 Meets in Atlantic City on June 17-19

Subcommittee meetings and the presentation of two papers feature annual gathering

► The Annual Meeting of Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials was held in Atlantic City, N. J., on June 17-19 in conjunction with the 60th Annual Meeting of the parent society. Subcommittee meetings were held in the morning and afternoon of June 17 and 18, while the morning session on June 19 was devoted to a meeting of D-11 itself and the presentation of two papers.

The first of these, "Proposed IPCEA Specification for Dimensional Tolerances", was presented by G. J. Crowdes (Simplex). Mr. Crowdes, a representative of Subcommittee 5 on Wire and Cable, noted that IPCEA Project Committee 356 was started almost five years ago to study tolerance limits of electrical insulation and sheath thicknesses for the purpose of writing a more realistic specification than the one now in use.

This group, which consists of representatives from several manufacturers of wire and cable, has gathered measurements on insulation thickness from many manufacturers covering a production of approximately 75 per cent of that of the whole industry. These data were accumulated for the purpose of determining the process capability of the industry and were limited for a start to rubber and thermoplastic insulation, both by the extrusion process and the strip method.

Describes Proposed Specification

Mr. Crowdes described a proposed specification as recommended by the Insulated Power Cable Engineers Association, offering pertinent data and test results. He noted that IPCEA feels that the form of specification recommended will provide a great amount of knowledge about the product for both the manufacturer and the purchaser with a minimum amount of inspection.

The second paper presented at the D-11 meeting was entitled "Dynamic Flexing Apparatus for Ozone Testing" by Dale J. Milnes (Mast Development), chairman of the Special Subcommittee to Investigate Ozone Flexing Apparatus. The author first offered a definition of flexing and discussed the need for an ASTM standard covering apparatus for ozone testing.

Mr. Milnes presented a description of various apparatus presently in use, pointing out the advantages and the disadvantages of each. Slides were shown of many of the instruments discussed. He also described the Mast "Dynamat", an ozone flexing unit developed by his company and now in use.

The speaker then disclosed the results of a preferential questionnaire which had been sent out to ozone test chamber users. Based upon this survey, recommendations were offered as to testing procedures and the mechanics of ozone testing.

Schatzel Addresses Meeting

R. A. Schatzel (Rome Cable), who has just been succeeded as president of ASTM by Richard T. Kropf (Belding Heminway), addressed the D-11 meeting, informing the members as to current activities at headquarters. Mr. Schatzel stated that a Planning Committee has been organized to consider future activities of the organization. He noted that the parent society is in good financial condition. An investment counsel has been engaged and a pension system established for ASTM employees. ASTM headquarters have been remodeled and modernized and a Rebuilding Committee formed to investigate further activities in this direction.

The meeting was also honored by a short address by Arthur Whiting Carpenter, former secretary of D-11, and the winner of this year's Charles Goodyear Medal from the Division of Rubber Chemistry, American Chemical Society. In brief remarks, Mr. Carpenter paid tribute to the many persons who contributed to the activities which have culminated in the award.

It was also announced at the meeting that A. E. Juve (Goodrich) has been elected an ASTM director for a three-year term. Mr. Juve has been associated with D-11 for many years and is currently chairman of Subcommittee XXIX on Compounding Ingredients. Mr. Juve is a past-chairman of the ACS Rubber Division.

In other activities at the meeting, it was announced that the Messrs. Seaman, Patterson, Stiehler, Ball, Maassen, Fisher and Forman have been appointed to a Committee on Nomenclature to consider necessary changes to the recently published "Glossary of Terms" relating to rubber and rubberlike materials (ASTM Special Technical Publication No. 184).

Simon Collier (Johns-Manville), chairman of D-11, announced that approval has been granted for ASTM participation in the ISO conference in 1959. While no definite date has been set, it was noted that ISO will meet about two weeks before the International Rubber Conference which will be held in Washington, D. C.

Also announced was the fact that I. D. Patterson (Goodyear) has been named to succeed L. Cooper as secretary of Subcommittee XIII on Synthetic Elastomers. The name of Subcommittee XVI has been changed to Description and Classification of Rubber Compounds. Dr. I. Drogin (United Carbon) has accepted appointment as liaison to Committee D-24 on Carbon Black, while J. Massey will serve in a similar capacity to Committee E-7 on Non-Destructive Testing. Richard Bauman will serve as liaison to E-10 on Radioisotopes and Radiation Effects.

It was made known at the meeting that the forthcoming meeting of D-11 which will be held in February, 1958, in St. Louis, Mo., will feature a symposium on ozone testing. It was also announced that the 1958 annual meeting will be held in Boston, Mass.

Reports from the different subcommittees which met during the D-11 meeting follow herewith:

Subcommittee 5—Wire and Cable (J. T. Blake, Simplex Wire & Cable, Chairman): The results of the recent letter ballot were reported and all items were declared accepted. It is recommended that they now be adopted by D-11. It was agreed that the Test Section will continue to appraise methods for testing corona level of cables. Mr. Perkins of D-9 will keep in touch with the Test Section. It was voted that D-11 be requested to appoint Mr. Pickells as liaison with D-9 on this subject. A number of editorial changes in D-1350 were suggested and adopted. It was voted to ask D-11 to assign to Subcommittee 15 the problem of specifying air oven testing to the extent where more reproducible results may be obtained.

Subcommittee 6—Packings (R. F. Anderson, Chairman): H. G. Koch of Johns-Manville reported on the stress relaxation program in progress in Subsection 10C of Tech. A. Round-robin testing indicates the need for uniform test apparatus to minimize the effect of spring in the fixture. The chairman reported on the status of the sealability program in Subsection 10C of Tech. A. Further round-robin testing is scheduled with varying lockup pressures and higher internal pressure.

Discussion of the need for a corrosion requirement indicated that a number of members favored such a requirement, provided a satisfactory procedure could be developed which would provide a means of differentiating between materials. A measure of degree of corrosion would also be required. It was felt that such a requirement should be considered for materials covered by D-1170. This expression

is being referred to the chairman of Subsection 10C, Tech. A.

The inclusion of "O" rings in the discussion on corrosion prompted Mr. Chatten, N. Y. Naval Shipyard, to inform the committee that the Bureau of Ships has developed a tentative specification on "O" rings. Copies of the proposed specification will be furnished the committee by Mr. Chatten for comment.

Subcommittee 7—Rubber Latices (G. H. Barnes, Chairman): Discussions covered the following items of business: (1) KOH Number—A proposal by the RRI to consider the fact that the present KOH number of 0.8 is not adequate to cover certain low ammonia latices stabilized with preservatives such as boric and lauric acids. The committee did not feel that a change should be made without further recommendations by W. G. Wren of RRI. Mr. Allen was asked to apprise Mr. Wren of this decision. (2) Density Methods—Discussion took place concerning recommendations for a density determination method proposed by BSI for subsequent presentation to the ISO this Fall. A review of the proposal by the committee revealed no advantages for the method over existing ASTM methods. The discussion centered around the fact that apparent density of latex as received, is of more value than is absolute density. The committee is revising ASTM Method A for submission for letter ballot. This revised method is capable of yielding an apparent density value for centrifuged latex. No satisfactory method is known for determining apparent density of creamed latex. Dr. Stiehler will communicate with BSI on this matter.

(3) Latex P Value—Dr. McGavack discussed advantages of the p value test for latex. This, he stated, is a method for calculating volatile fatty acid based on the water phase of the latex. Dr. McGavack will issue the procedure to committee members for review.

Subcommittee 8 — Nomenclature and Definitions (R. G. Seaman, Rubber World, Chairman): Draft definitions for ISO recommendations numbers 48-53 of ISO/TC-45 Working Group 5 on Terminology of June, 1956, were reviewed in order to instruct the American delegation to the Zurich, Switzerland meeting of ISO/TC-45 in September. Certain suggestions for changes in these definitions were agreed upon and will be provided the American delegation in advance of their departure. Subcommittee 8 plans to develop ASTM Tentative Recommended Practices for elastomer terminology based upon material in the recently published "Glossary of Terms Relating to Rubber and Rubber-like Materials", and from other sources. Emphasis will be given also to terms in which ISO/TC-45 is interested.

Subcommittee 9—Insulating Tapes (C. W. Pickells, Consolidated Edison, Chairman): This subcommittee met and recommended the following changes in the proposed revisions of Tentatives D69-52T, D119-48T and D1373-55T presented to Committee D-11 for letter ballot. S69-52T—Specifications for Friction Tape for General Use for Electrical Purposes: Section 13, add the word "average" before "thickness" and "width". New Section 19, the last sentence of Paragraph (b) shall read "The purchaser reserves the right to reject the shipment if the second sampling fails to conform with the applicable requirement. Section 26, in the last sentence, delete the words "and the maximum, minimum and average of these five measurements shall be reported" and substitute the words "and the average of these five measurements shall be the average thickness and width referred to in Section 13".

D119-48T — Specifications for Rubber Insulating Tape: Section 8, in the first sentence add the word "average" before "thickness" and "width". In the second sentence delete the words "nor the average length more than 5 per cent in excess of it" and substitute the words "and the average length of the rolls in any sampling shall not be more than 5 per cent in excess of it." Section 20, delete from the last sentence the words "and the maximum, minimum and average of these five measurements shall be reported" and substitute the words "and the average of these five measurements shall be the average thickness and width referred to in Section 8".

D1373-55T — Specifications for Ozone Resisting Rubber Insulating Tape: Section 9, change as recommended above for Section 8 of Tentative D119. Section 22, renumber as Section 21 and in the last sentence delete "and the maximum, minimum and average of these five measurements shall be reported" and substitute "and the average of these five measurements shall be the average thickness and width referred to in Section 9." These changes resolved the one negative vote returned by the letter ballot in Committee D-11.

Subcommittee 10—Physical Testing of Rubber Products (L. V. Cooper, Firestone, Chairman): R. F. Turner, chairman of the section investigating the possible variation due to the uses of single or double spools when testing "O" rings reported that, although their work was not finished, no difference was as yet apparent in the final results whether single or double spools were used and also no difference if the lower spool was rotated or not.

Mr. Juve of the Task Group investigating methods of determining equivalent cure, stated that his group had a meeting. His committee asked for more definite instructions. Discussion within the group revealed the need primarily of translating the state of cure of very small articles to 1/10 inch tensile and ½ compression set slabs. His group will continue its work.

Mr. Scott reported for the section on machine calibration. Preliminary studies reveal that there is need for considerable study as few, if any, are using the method as now given in D412. Mr. Scott promised a complete report at the next meeting. The chairman informed those present that the scope of D-11 was being investigated and stated he would be happy to receive a letter from anyone present giving his ideas as to how the scope should be written.

Subcommittee 11—Chemical Analyses (W. P. Tyler, Goodrich, Chairman): The results of the testing program on carbon black determination by the pyrolysis method were reported. Reproducibility and accuracy were good in the low carbon black range using a variety of blacks. However, more testing is planned on higher loadings and with mineral fillers present. Test results on a proposed absorptiometric method for zinc determination showed excellent reproducibility and accuracy. The program will be extended to cover other types of compounds. Test results on a rapid extraction method on rubber compounds indicated the need for further study but in principle the method is promising. A joint task group with Subcommittee 13 reported on a testing program on the determination of mixed alkylated phenols in SB-R type rubbers. The testing program was successful.

The subcommittee straw ballot on the proposed method for melting range of rubber chemicals was discussed. G. C. Maassen provided arguments for proposing the method as a Tentative Standard in spite of the lack of reproducibility of the test. A subcommittee letter ballot will be proposed which will include pertinent portions of the discussion. The subcommittee voted to recommend the publication of the report prepared by this task group in the ASTM Bulletin with suitable changes agreed upon by the editors and the task group. Preliminary samples of

Biosynthesis of Rubber

► A Soviet scientist is reported to have traced the biosynthesis of rubber in the rubber-bearing plant, Kok sagyz. Details of the experiments were given at the National Conference on the Use of Radioactive Isotopes held in Moscow recently. The method consists of introducing into plants solutions of various synthetic compounds containing atoms of radioactive carbon. Following a definite period, the plants are analyzed to determine whether radioactive carbon has been assimilated into the final product and, if so, in what quantity. This makes it possible to establish which particular compound is an intermediate product in the synthesis of rubber. It has been established as a result of these experiments that rubber is formed in plants through the stage of alanine, the amino acid contained in albumen. An accessory substance of rubber, carotene, is formed in Kok sagyz from acetic acid and the alanine. The part that alanine plays in rubber formation has been demonstrated for the first time and is of considerable importance both from the scientific and economic point of view. Research into this problem still continues the report stated.

standard samples are available for testing new sulfur determination methods. Several laboratories will test the high temperature combustion methods on these samples.

Subcommittee 12—Crude Natural Rubber (Norman Bekkedahl, National Bureau of Standards, Chairman): Two gentlemen representing the General Services Administration in Washington, the agency that administers the Government's huge rubber stockpile, were present. They were seeking information as to whether or not the mould that develops on rubber during storage has any deleterious effects on rubber products made from it. It was decided by this committee that we should not enter into any research or testing program with GSA unless requested to do so by the Rubber Manufacturers Association. Dr. Stiehler reported that by the end of this year the National Bureau of Standards hopes to have a standard natural rubber and a standard mercaptobenzothiazole for distribution. L. G. Mason presented a progress report on this task group on Test Methods and Specification for Rubber. It was pointed out that because of the short time that the rubber is permitted to remain on the docks after unloading from the ships, quick test methods would be extremely desirable. Recent experiences with large amounts of ash found in some of the natural rubbers indicate an urgent need for a specification.

Subcommittee 13—Synthetic Elastomers (B. S. Garvey, Jr., Sharples Chemicals, Chairman): With the resignation of L. V. Cooper as secretary of Subcommittee 13 I. D. Patterson was appointed secretary. L. G. Mason, chairman of Task Group 1, asked J. J. Allen to report on Committee D-11 letter ballot on sampling solid synthetic rubbers as preprinted. These results were as follows: Affirmative 84, negative 5, not voting, 91. After an hour's discussion on reasons for negative votes, 4 of the 5 negative ballots were resolved so that the final vote was affirmative 88 and negative 1.

Messrs. Otto, Stiehler, and Black were asked to help Mr. Mason reword the scope and footnote to emphasize random sampling and examples to be considered as clarification of method and not as a specification. Representatives of synthetic rubber black masterbatch producers and Mr. Mason are to recommend any additions and changes needed to cover sampling black and black-oil masterbatches represented by series SBR-1600 and SBR-1800 at next meeting.

B. C. Pryor, chairman of Task Group 2—Chemical Tests for Dry Synthetic Rubber—reported on work done. Motion was carried to submit retroactive, concurrent letter ballot to Committee D-11 and Subcommittee 13 to incorporate the former government (FFC) method for determination of ETA extract of dry synthetic rubber in ASTM D146-56T. Mr. Pryor reported on results of cross check between 9 laboratories on determination of alkylated phenol antioxidant in dry rubbers SBR-1006 and SBR-1502. Accuracy within laboratories and between 8 laboratories was excellent, complete and adequate with standard deviation of 0.01 to 0.05. Nine laboratories out of eleven having samples reported results. The data will be submitted with letter ballot to Subcommittee 13. Mr. Sackfield submitted an alternate method for determination of alkylated phenol antioxidant in oil masterbatches to the task group for further consideration.

Motion was carried by a vote of 5 to 2 requesting the task group to establish the Government (FFC) shrinkage test as an ASTM method. Method for determination of antioxidant in oil masterbatch and black masterbatch will be considered in the future. Motion was carried unanimously to set up a task group in Subcommittee 13 on physical testing if consistent with work of other committees. Opinion was expressed that physical test methods for synthetic rubber should be separated.

I. D. Patterson reported on letter ballot in Latex Task Group 4 regarding proposal to use isopropanol and phenyl beta naphthylamine as supplemental drying aids in determination of total solids in SBR latices via method D1417-56T. The vote was 3 against the proposal and 2 in favor of it. Therefore, this addition or change in the method will not be considered.

R. G. Seaman, chairman of Task Group 5 on Nomenclature, submitted a report. Motion was carried unanimously that retroactive letter ballot to Subcommittee 13 and Committee D-11 be submitted to cover the classification and coding of silicone elastomers by the symbol Si in D1418. The Si family, both in dry and latex form, shall be further defined as follows:

Si—silicone elastomers having only methyl groups on the polymer chain; PSi—silicone elastomers having both methyl and phenyl groups on the polymer chain; VSi—silicone elastomers having both methyl and vinyl groups on the polymer chain; FSi—silicone elastomers having both methyl and fluorine containing groups on the polymer chain; PVSi—silicone elastomers having methyl, phenyl, and vinyl groups on the polymer chain.

Polyurethane elastomers will be considered for a separate group in the future. B. S. Garvey reported assignment of SBR numbers to 8 dry rubbers and latices as follows: 1605, 1773, 1778, 1803, 1812, 2110, 2111 and 2112. Motion was carried unanimously that these SBR rubbers be added to the lists in D1419 and D1420 and be published in the rubber journals. Future numbers will be assigned consecutively except for proposals to be submitted by Texas-U.S. for 1061 and 1551.

"Must be cis-polyisoprene!"

Subcommittee 14—Abrasion Tests for Rubber Products (R. F. Tener, Chairman): A. I. Ross, chairman of the RMA Technical Committee on Heels and Soles, outlined the laboratory testing employed in the development of the RMA method of test for determining the resistance to abrasion of rubber heels and soles using the NBS abrader. Also Mr. Ross asked that consideration be given to the RMA method as a revision of method B of D394. Since the RMA method is somewhat restrictive in scope, the committee agreed that a new method licensed on the RMA method will be prepared and that D394 will be revised to bring it up to date. The new method and revisions will be available for subcommittee consideration at its next meeting in February, 1958.

Subcommittee 15—Life Tests for Rubber Products (G. C. Maassen, R. T. Vanderbilt, Chairman): There was no meeting of Subcommittee 15 during the annual meeting of Committee D-11. Since the last meeting of the subcommittee, a revision of Spec D518 was letter ballotted with only three negative votes which have been reconciled. One of the negative votes requires an editorial change in the proposed revision to include that the observation for cracks after exposure be made under a 7 power hand glass. This is in conformity with Spec D1149. It is recommended that this change be incorporated in the revision.

Subcommittee 16 — Description and Classification of Rubber Compounds (J. F. Kerscher, Chairman): The chairman called attention to the change in the name of the subcommittee from "Classifications and Specifications for Rubber Compounds" to "Description and Classification of Rubber Compounds" as reported in the minutes of the June 21, 1956, meeting. A change has been made also in the scope of the subcommittee, as follows: "To prepare a system for description and classification of rubber compounds for general use."

The chairman then reviewed other actions at the June, 1956, meeting and stated that the action to appoint a task group to iron out present differences of opinion and recommend a generally acceptable system for the description and classification of compounds for general use had not been carried out because of the difficulty in finding a chairman for this task group.

The two most recent proposals for descriptions and classification systems for rubber compounds for general use are those of G. King, Yale Rubber Co., which was presented before the recent meeting of the Rubber Division, ACS, Montreal Canada, May 15-17, and the so-called "Expanded Tabular System", worked out by SAE-ASTM Technical Committee on

Automotive Rubber, Subsection IV-D-5. The latter system consists of two large tables, one consolidating the basic property tables of ASTM D735 for the RN RB, RS, SA, SB, SC, TA, TB rubbers into one table, and the other consolidating all aging changes into a large suffix table. The tables are the same as the original D735 tables but have been made into two large tables for easier handling and to permit the easy addition of new compounds from future new rubbers.

There are certain values still to be worked out for the "Expanded Tabular System," but compound description on the "Line Call Out" basis may be made, for example: 2 SB715$A_2B_4E_1E_mF_1$, 2 is the sub-class, SB is the class, 7 is 70 durometer, 15 is 1500 psi tensile strength, A_2 is 70 hours air aging at 250°F., etc. Other systems considered to date are the Dutch, German, modified D735 system, and the system proposed by Warren Scoville, U. S. Rubber Co.

It was decided to ask Mr. Scoville to head up the task group to review all of the systems proposed to date with special emphasis on the "Expanded Tabular System", and make a recommendation for a system for adoption. There was considerable discussion of the flexible versus the rigid system, that is, a rigid system that would not permit the design engineer to specify compounds beyond the realm of practicability, and the flexible system that would permit compounds to be specified that might not at this time be considered practical or at least economic. It was pointed out that the reason for the work of Subcommittee 16 was primarily to prevent the use of the tables in D735 for purposes for which they were not intended.

A system based on individual product requirements is not considered practical. The basic requirement, before any system can be worked out, is the establishment of ground rules for the use of the system and in this connection the work of the Molded, Extruded, Lathe Cut and Chemically Blown Sponge Rubber Subdivision of the Rubber Manufacturers Association during the past year in preparing a brochure on their products and how they were made, was suggested as having value to Subcommittee 16 in connection with information that might be required to develop a description and classification system.

ISO/TC-45 Working Group 6 (Netherlands-6) documents 8 and 9 of February, 1957, were circulated by the chairman. Document 8 is a system for graduating properties of rubber compounds as defined by TC-45 in ISO/TC 45/WG 6 document 252. Document 9 is an ISO draft for a specification system for vulcanized rubbers. Both documents 8 and 9 will be reviewed by the members of Subcommittee 16 and comments returned to the chairman by July 31, who will pass these comments on to the chairman of the task group.

Subcommittee 17—Tests of Hardness, Set and Creep (S. R. Doner, Raybestos-Manhattan, Chairman): Dr. Stiehler of the Bureau of Standards reported that the Wallace Co. of England is producing an ISO Hardness Tester which by the purchase of an auxiliary unit makes it suitable for taking hardness readings at temperatures down to —70°C. The National Bureau of Standards has ordered one of these units, and Mr. Stiehler will report on it at the next meeting.

Mr. Frye gave a qualitative report on the conclusions he arrived at on the round-robin hardness testing program started in 1954. The final report based on a statistical analysis will be available later. Mr Frye made the following motion, which was seconded by Mr. Juve and unanimously approved by those present: Submit to Committee D-11, Letter Ballot, the following change in D-676-55T—"Alter sketch and paragraph (c) to change indentor extension tolerance from 0.100 ± .000 to 0.100" ±.000"
.010 —.003"."

"Alter note to read: Previous to March, 1955, a great number of Durometers were in use which had an indentor extension of .092" to .095". A great number of specification values were necessarily based on readings of these Durometers. The Durometer as specified in this method will yield readings which vary linearly from 3 units higher at 30 to 1 unit higher at an indentation value of 90."

Last February a letter ballot was circulated to the members of Subcommittee 17 to determine whether D314 the "Standard ASTM Hardness Method" should be advanced to Standard or deleted from the book. 24 ballots were returned, 10 favored advancing it to standard, 10 favored deleting it from the book and 4 returned no-vote ballots. It was decided to table this subject. Mr. Shore described his improved current production Durometer, which can be more easily adjusted. Mr Bachelder demonstrated the latest model "B Wallace" ISO hardness tester.

Subcommittee 19—Tests for Properties of Rubber and Rubber-Like Materials in Liquids (F. H. Fritz, DuPont, Chairman): Dr. Stiehler, representing the International Standards Organization, reported on the status of fluid aging specifications. Due to lack of agreement between various countries, a new proposal is being drafted. This will be circulated within Subcommittee 19 for comment later in the summer. The report from Task Group A, relative to the adequacy of D471 test methods at temperatures of 250°F and over, was tabled until the next meeting.

Discussion was started on the need for new test fluids to fulfill industry testing requirements. It was agreed that the time was not yet right for action in this area. Question arose as to changes in composition of ASTM No. 3 oil reported by one rubber manufacturer. The chairman will contact the supplier of this test fluid to determine the reliability of this report.

Subcommittee 21 — Cements and Related Products (J. F. Anderson, B. F. Goodrich, Chairman): The rapid method for determining Total Solids of rubber cements, using Cenco Moisture Balance will be reported by Francis P. Canty at the next meeting. The Chrysler-Bendix Disk Shear Test was discussed. Several laboratories are working on the method and, in general, improvements are needed, particularly in the application of liquid cements and obtaining even pressure during cure. C. R. Lupton and A. J. Thomas, of the Bendix Products Division, described a test for bonds between friction material and automotive transmission bands. This method utilizes Magniflux Corporation's "Sonizone", an effective means of detecting and recording failure points non-destructively. Bendix will write up the procedure. A previous method, identified as a "Beard Test" had been circulated to the committee and received six affirmative votes, eight non-voting replies and one negative vote. The Sonic Method was offered as an explanation for the negative vote. Further action will be taken at the next meeting.

Subcommittee 22 — Cellular Rubbers (N. G. Bimmerman, DuPont, chairman): Copies of tentative specifications and methods of test for polyvinyl chloride foam, Designation V, dated May 23, 1957, and Tentative methods of test for flexible urethane foam, dated May 24, 1957, were distributed and discussed. It was moved that the chairman request prompt comments from the members and if these comments as well as those of Subcommittee A were favorable, a letter ballot would be circulated in D-11. Permission for the letter ballot was requested at the D-11 meeting on Wednesday, June 19.

A request has been received that the tolerances on dimensions shown in the appendix of D-1055 and D-1056 be made a part of the specifications. After a discussion, it was moved that this be letter balloted in D-11 and that the same method of handling be used in the future with the polyvinyl chloride and urethane foams. The methods of measuring cellular products were discussed and it was finally agreed that the present methods were reasonably satisfactory. No improvements were suggested.

The chairman had received a letter from a manufacturer of a foam indentation test machine, calling to attention other devices which have been advertised for running this test, which differed in the method of loading. He believed that the

Links Past and Present

► *Mayflower II* linked the past with current scientific advancement on its commemorative voyage, carrying a consignment of Darlington Chemicals as a part of the ship's cargo. The shipment of light magnesium carbonate, light magnesium oxide and magnesium hydroxide was made by Darlington Chemicals, Ltd., Darlington, England, to Darlington Chemicals, Inc., Philadelphia, Penna. The *Mayflower II* sailed from Plymouth, England, to commemorate the voyage in 1620 by the *Mayflower* that brought the Pilgrims to the shores of America.

committee should consider more completely, specifying the method of test. Discussion indicated that D-1055 probably did need some revision along these lines and a speed of compression of ½ to 25 inches per minute was recommended. Drs. Yoran and Wohler will re-write this paragraph.

The sub-committee has been requested to consider specifications for railroad journal box lubricators. One thought was to include SC tables in D-1055 to cover the type foam now used. It was felt that more work was required before this could be done and Mr. Goebel promised to work with Mr. Allen on this problem.

Mr. Lichtenstein, of the U. S. Signal Corps, brought up the matter of additional tables in D-1056 to cover silicone sponge. It was brought out that a previous study indicated limited interest in these sponges and did not appear to justify separate tables. Mr. Lichtenstein also felt that additional limits were needed on low temperature R grades of expanded rubbers. It was recommended that he work with his suppliers in order to submit definite recommendations to Sub-committee 22.

Subcommittee 23—Hard Rubber (W. J. Dermody, Stokes Molded Products, Chairman): The subcommittee had two methods which were voted on D-11 letter ballot. One negative vote was received on the proposed revision of D-530, Methods of Testing Hard Rubber Products. This vote, based on a difference of opinion on conditioning time, was reconciled at the meeting and is now affirmative.

Two negatives were received on the proposed method of test for Indentation of Hard Rubber by Type D Durometer. One of these negatives was based on the differences between this method and D-676, Method of Test for Indentation of Rubber by Means of a Durometer. This vote was reconciled through correspondence and is now affirmative.

The one remaining negative vote was registered by R. Stiehler, National Bureau of Standards. Dr. Steihler's objection is as as follows: "The proposed method introduces a new hardness scale that is bound to result in greater confusion and will nullify, to a large extent, the International Hardness Scale recently adopted by ASTM. The International Hardness Scale has the virtue of being adaptable to hard rubber as well as very soft rubbers by the simple expedient of expanding either end of the scale. Thereby, there would be a single hardness scale for all materials handled by Committee D-11. The introduction of another scale at this time would be most unfortunate."

Subcommittee 23 has considered Dr Stiehler's objection and feels that, inasmuch as the method voted upon has, in essence, been in widespread use for many years in the testing of both hard rubber and plastic materials and there is available an abundance of data based on its use, it does not comprise the introduction of a new scale, but rather, the standardization of an accepted scale, which is in line with the aims of the Society. Subcommittee 23 by unanimous vote, therefore, recommends to D-11 the adoption of the proposed method with due note of Dr. Stiehler's objection.

There were four recommendations for editorial changes: First, to change the word "Indentation" in the title to "Penetration"; Second, to clarify the wording in Section 4 on temperature of test; Third, to add the words "other than finished products" after "Specimens" in the last sentence of 4b1, in order to further clarify the conditioning procedures and fourth, to delete the words "a minimum of" from the last sentence in 5d. These changes will be made. Task force 1 reported satisfactory progress in the round robin on revision of the falling weight impact test in D-530.

Mr. D. E. Jones reported by letter on methods of water absorption and was appointed chairman of Task Force 5 to draft a proposed Method of Test for Water Absorption of Hard Rubber in line with the recommendations in his report. Task Force 4 reported that recommendations for a scheme of hard rubber classification will be available shortly. There was no report on standardization with D-20, but Subcommittee 1 of D-20 has requested through the parent committee that it be granted joint jurisdiction with D-11 on method D 676-55-T.

Subcommittee 24—Tests for Coated Fabrics (K. L. Keene, U. S. Rubber, Chairman): Minutes of the February 5 1957 meeting were read and approved. The chairman's reply to Mr. Appel regarding the proposed Method 5230 for Federal Specification CCC-T-191 b was read. Discussion indicated that DuPont's Newburgh lab had a similar tester. The tester is considered good for comparative testing but not for quality control because it conducts a slow test. It operates at 25,000 cycles per hour and some tests require 30 days to reach the end-point. No member had had any experience with the tester described in Method 5230. The Committee feels it has completed its work.

A letter from Mr. Smith on the work of Committee E-12 on appearance was read and discussed. It was agreed not to initiate work in this field at this time.

The results of the letter ballot on Diaphragm Burst Tester in D-751-57T were: 9 affirmative, 1 not voting and 1 negative vote. This is an inadequate return. Therefore, it will be resubmitted to the membership.

Mr. Bryan reported that he had 900 paired specimens, representing a wide range of fabrics, prepaired for determining adhesion at 2 and 12 inches per minute. These will be sent to seven members of the task group within the next three weeks so that work can be completed in time to report at the February meeting. Instructions will be submitted with test specimens. All charts are to be returned to Mr. Bryan. No report on Cold Flexibility was received from Mr. Hovorka.

Copies of Mr. Corry's interlab test on Tack Tear were distributed. Four laboratories made tests and the report represents data from three devices. Correlation between laboratories was fair but not good enough to recommend the method as an ASTM Standard. Task Group will make a further study to determine whether variations result from the test jig or test machine (tensile).

Mr. Keene proposed that the Subcommittee initiate work on abrasion testing. The last work, completed in 1950 and comparing the Wyzenverk and Taber tester was inconclusive. Mr. Taber had been invited to send a representative to this meeting, but no one attended. Mr. Bachelder of Testing Machines, Inc., volunteered to collect information on the various machines available for testing coated fabrics. It was also voted to refer abrasion testing as an unsolved problem to the D-11 Liaison officer to the ASTM Administrative Committee on Research. A poll of the members present showed that 10 laboratories had one tester, seven had two types and three had as many as four types of abrasion testers.

Even though the number of laboratories using the dead-weight stretch test is limited, it was agreed that a task group should be set-up because the dollar value of goods processed requiring this type of test is high. It was announced that committee week will be in February, 1958 and will be held in St. Louis, Mo.

Subcommittee 25 — Low Temperature Tests (R. S. Havenhill, St. Joseph Lead, Chairman): The D746-55-T Brittleness test was discussed. Robert G. Dunlop of the Smithers Laboratories gave a talk describing their ball thrust method of measuring the impact speed of the Scott Solenoid Tester. Using 115 volts on the Solenoid a velocity of 9.6 f.p.s. was obtained. The following committee was appointed by the chairman to determine the speed of several Scott Solenoid machines using this method: Robert G. Dunlop, chairman; N. G. Duke, D. C. Scott, R. E. Ofner and A. E. Hicks. The chairman of Subcommittee 25 was authorized to send out a questionnaire to its members to determine the size of the test specimen.

D1053-54-T (Torsion Wire Stiffness Test) was next on the agenda. R. E. Ofner, chairman of the revision committee, circulated copies of the revised draft which includes a go-no go provision. A motion was made, seconded and unanimously carried for a letter ballot of the revised draft in D-11.

Regarding the Low Temperature Hardness Test, Irving Kahn and Max Hanols presented data and comments on the use of a built in foot, no foot or separate foot. This information, which indicated somewhat irregular correlation will be studied prior to discussion at the ISO meeting in Zurich, Switzerland.

The chairman reported no negative letter ballots in Subcommittee 25 on the proposed additions to method D1329-54-T (TR test). A motion was made, seconded and unanimously carried that the following two sentences be added to the method subject to letter ballot in D-11: page 641 —under heading "Testing Elongation 6", at the end of the paragraph, add the following two sentences. "In such studies (4), crystallization of the long time conditioned specimens is indicated by the displacement of the T-R curve toward the higher temperatures. Tests conducted at

50% elongation without previous elongation without previous long time conditioning (4) have been found to correlate fairly well with stiffness tests."

This revision makes the present method more useful by adding an explanation of results obtained in studies using 50% elongation, which is already allowed in the present method.

Subcommittee 26 — Processibility Tests (R. H. Taylor, Scott Testers, Chairman): Through D-11 member, John Ingmanson of Dr. McPherson's committee on research, an invitation was extended to the subcommittee to present for consideration, "Challenges in Materials Research". James S. Seely, in a letter to the chairman, recommended that consideration be given to the establishment of additional methods for evaluating processibility. After some discussion, the committee authorized the chairman to appoint a task group to review the problem and report back their recommendations at the next meeting. Mr. Seely will be chairman, with W. Newlin Keen and Dr. B. S. Garvey, Jr., appointed for this task.

A proposal submitted by Dr. R. D. Stiehler recommending revisions in ASTM Method D927-55-T with the idea of making the method less restrictive was tabled without action at the request of the subcommittee.

The ISO/TC-45 second draft ISO proposal for the Determination of Viscosity of Rubber by the Shearing Disk Viscometer, Document 311, and Draft ISO Proposal for the Determination of Rate of Cure of Natural Raw Rubber in a standard compound by the Mooney Viscometer, Document 316, submitted by the U. K. Delegation were considered. The subcommittee authorized the chairman to recommend to D-11 that they instruct the delegation to the next ISO conference to vote for acceptance of Document 311 as submitted and that paragraph three of Document 316 relative to test temperature be revised to conform with paragraph 5a of ASTM Method D1077-55-T.

As a result of a proposal to revise ASTM Method D1077-55-T to include rate of cure and the subsequent discussion, the chairman was instructed by the subcommittee to appoint a task group to prepare a revision of D-1077 along these lines but also to combine ASTM Methods D927 and D-1077 into one method, which will in turn be submitted to the subcommittee and to D-11 for their consideration. With Ross Shearer as chairman, H. R. Moon and Dr. I. Drogin were appointed for this task.

Subcommittee 28 — Statistical Quality Control (E. M. Bader, Goodrich, Chairman): Two task forces were formed at the 1956 annual meeting. One task force was assigned the problem of reviewing all D-11 test procedures and evaluating the sampling procedures contained in them. The other task force was assigned the problem of reviewing all D-11 specification and evaluating the sampling procedures contained in them.

This year's meeting was spent discussing a report of the findings made by the task force on specifications. This report indicates wide differences among the D-11 specifications in the treatment of sample sizes and sampling procedures.

Subcommittee 29 — Compounding Ingredients (A. E. Juve, B. F. Goodrich, Chairman): The proposed method for evaluating carbon blacks which had been circulated for comment in the subcommittee was discussed. The criticisms were relatively minor in nature and after rejecting a proposal to incorporate this method into D-15 it was voted to submit the proposed method to D-11 for letter ballot of the committee. The proposal for incorporating the method into B-15 had merit in that some duplication of matter in D-15 will result. However, the prospective users of the method were nearly unanimous in preferring a separate method dealing only with carbon blacks.

The letter ballot in D-11 of the proposed revision of D-15 was considered. The one negative ballot was discussed and an editorial change made to handle one of the three objections. No action was taken on the other two. Numerous editorial changes have been suggested in the method which has been transmitted to the secretary, Mr. Allen. The prospects are now good that a natural rubber standard will be established within the next six months.

A new reference material, MBT, will also be added. A new lot of reference standard No. 386, 15W Types SBR will soon need to be made. It was proposed that a note be added to the D-15 method suggesting the use of a barrier film such as aluminum foil to prevent contamination of stocks during molding by materials deposited on the mold surfaces from previous cures.

American Group for ISO/TC 45 (Robert D. Stiehler, National Bureau of Standards, Chairman): The following methods have been adopted as official ISO Recommendations: KSO/R33, DuPont constant load method of measuring abrasion resistance of vulcanized natural and synthetic rubbers; ISO/R34, determination of tear strength of vulcanized natural and synthetic rubber (crescent specimen); ISO/R35, determination of the mechanical stability of latex; ISO/R36, method of testing the adhesion of vulcanized natural and synthetic rubbers to textile fabrics; ISO/R37, Tensile stress-strain test of vulcanized natural and synthetic rubbers. It is anticipated that the International hardness test will become an official ISO Recommendation in July, 1957. In addition, five Draft ISO Recommendations pertaining to latex are now being letter ballotted.

The seventh meeting of ISO/TC-45 will be held in Zurich, Switzerland from September 30 to October 5, 1957. The United States Delegation will include the following members of the American Group: G. H. Barnes, H. G. Bimmerman, S. R. Doner, R. S. Havenhill, Irving Kahn, J. F. Kerscher, G. C. Maassen, and R. D. Stiehler. It is planned to have a meeting of the United States Delegation in New York before the fall meeting of the ACS Division of Rubber Chemistry. The eight meetings of ISO/TC 45 will be held in New York from October 26 to 31, 1959. This meeting will be followed by an International Rubber Conference in Washington from November 8 to 13, which will be jointly sponsored by the ACS Division of Rubber Chemistry, ASME Rubber and Plastics Division and ASTM Committee D-11. R. G. Seaman replaced Dr. H. I. Fisher on the American Group for ISO/TC 45.

Technical Committee on Automotive Rubber (J. J. Allen, Firestone, Secretary): The SAE-ASTM Technical Committee has approved the revision in the Silicone Tables of D-735 and SAE-10-R. Changes have been made and approved on; (1) SAE-60-R for Standard Rubber Cups for Hydraulic Actuating Cylinders; (2) The addition of a procedure for the physical testing of Elastomeric Color Coatings to the SAE-80-R Mat. Specifications; (3) The addition of two wire braided types C & D and two sizes to the SAE-40-R-2 Specification on Air Brake Hose. This change in SAE-40-R-2 necessitated the addition of a 3/16 and 13/32 inch size to ASTM D-622-55-T Tentative Methods of Testing Automotive Air Brake and Vacuum Brake Hose.

At the December meeting, J. M. Ball accepted the assignment of publicizing the activities of the Technical Committee on Automotive Rubber. The high points of activity in the quarterly meeting are made available to the staffs of ASTM and SAE for their distribution.

Several Military Specifications have been reviewed by the Hose sections, the V-Belt sections and the section on Rubber Tables in addition to their normal activities. The Automotive Gasket, oil Seal and 'O' Ring section has been very active on Gasket and Bench Leakage tests and specifications. In addition to modifying SAE-17-R and 18-R in accordance with D-1055 and D-1056, the Sponge sub-section has been very active in the fields of new materials and polymers.

The Rubber Classification Section has intensified its work on new polymers and designated new sub-sections on Impact, Adhesion, Tear, Flexing and on Latex Dipped Goods.

Names in the News

John Forney Rudy has joined the executive staff of the Goodyear Tire & Rubber Co. as assistant to executive vice-president R. S. Wilson with headquarters in Washington, D. C.

Edward L. Mears, associated with the Dewey & Almy Chemical Co. since 1930, has been appointed general manager of the Container and Chemical Specialities Division.

Fred L. Simon, formerly midwest district manager, has been appointed assistant sales manager of the Consumer Products Division for the Tyer Rubber Co. His headquarters will be at Andover, Mass.

Robert F. Pierce has joined the summer staff of Fabric Research Laboratories, Inc., Dedham, Mass. He will be engaged in investigations of the physical and mechanical properties of polymeric materials.

William H. Johnson, previously manager of supervisional training for the Textile Division of Goodyear Tire & Rubber Co., has been named manager of quality control for the company's textile mills. He will headquarter at the Cartersville, Georgia, plant.

James K. Buckwalter, who has been associated with the Wooster Rubber Co. since 1948, has resigned as vice-president in charge of sales.

J. F. Corcoran, sales manager of Goodyear-Peru, has been named the 1957 winner of the Jonas H. Mayer Business Enlightenment Award, which is conferred annually on a graduate of the American Institute for Foreign trade.

George L. Fetherolf, who has been associated with the Goodyear Tire & Rubber Co. for more than 10 years, has been named to direct automotive and crash pad sales for the Engineered Products Department.

John H. Long, assistant comptroller for the Goodyear Tire & Rubber Co. since 1953, has received a 45-year service emblem.

Paul J. Sullivan has been named resident manager of the Philadelphia sales branch of National Aniline Division of the Allied Chemical & Dye Corp., succeeding R. Robertson, who has retired. Leslie C. Wizemann, who has been active in the sales development of "Nacconols", will succeed Mr. Sullivan as manager of Detergent Sales.

George L. Dougherty, technical trainee with Bakelite since June 1956, has been named technical representative for the Extrusion Materials Division at the Boston district office.

John Grotzinger, manager of electrical engineering for the Goodyear Tire & Rubber Co., has been elected a Fellow in the American Institute of Electrical Engineers.

Roderick K. Eskew, Engineering Head at Wyndmoor Laboratory, U. S. Department of Agriculture, has been presented with the Department's Superior Service Award. During the war, Mr. Eskew directed an intensive program to develop a means of recovering natural rubber from native plants.

Salvatore J. Iuliano has been named production superintendent at the Amsterdam, Holland plant of the General Tire & Rubber Co.

Peter F. Schidrowitz, managing director of Latex Process and Dispersions Co., Ltd., Lancs., England, is visiting the General Latex and Chemical Corp. of Cambridge, Mass., following an association of the two companies as of April 1.

E. W. Kaufmann, who has served the chemical industry for more than 20 years, has been named exclusive representative in the Philadelphia area for the Baker Castor Oil Co.

Frank T. Magennis, president of the Goodyear International Corp., has received the Cuban Order of Highway Merit from President Fulgencio Batista in Havana at the Third National Highway Week celebration.

Karl O. Nygaard, an economist in the Business Research Department of the B. F. Goodrich Co. since 1954, has been appointed director of business research for the company succeeding Dean E. Carson, who has retired.

C. Russell Mahaney, vice-president and director of St. Regis Paper Co. and general manager of its Panelyte Division, has been elected president of the Society of the Plastics Industry, Inc., to serve for two years.

Robert M. Austin, acting superintendent since last November, has been named plant superintendent at the Illiopolis, Ill. plant of the Polyco-Monomer Department for the Chemical Division of the Borden Co.

George R. Vila, vice-president and general manager of the Naugatuck Chemical Division of the U. S. Rubber Co., has been elected a member of the board of directors of the Manufacturing Chemists Association.

Clifford S. Redfield has retired from the Eastern Utilization Research and Development Division, in Wyndmoor, Penna., of the USDA Agricultural Research Service.

Dr. Samuel L. Madorsky, a physical chemist at the National Bureau of Standards, has been awarded the Department of Commerce Silver Medal for Meritorious Service.

R. M. Joslin has been named manager of the Fine Chemicals Department, Union Carbide Chemicals Co., succeeding W. A. Woodcock, who has been appointed sales manager of industrial chemicals, Mr. Joslin's previous assignment.

B. E. Dougherty, Sr. has been presented with a 25-year service pin by Godfrey L. Cabot, Inc., in recognition of the services rendered by B. E. Dougherty Co. as sales agent for Cabot.

Kenneth C. Zonsius, director of advertising for the Goodyear Tire & Rubber Co., recently completed 40 years of continuous service with the firm.

A. B. Gordon, associated with Goodrich since 1948, has been appointed product manager of the Koroseal Film and Coated Fabrics Department for the B. F. Goodrich Industrial Products Co., Marietta, Ohio.

E. B. Hathaway has been elected vice-president in charge of trade sales of the Firestone Tire & Rubber Co. He has been with the concern since 1927.

R. E. Workman, manager of the Chemical Division of the Goodyear International Corp., has been awarded a Sloan Fellowship for participation in the executive development program at the Massachusetts Institute of Technology.

Andrew G. Duzsik has joined the Chemical Division of the Borden Co. as manager of manufacturing operations for the Resinite Department.

Richard M. McFarland has been appointed product manager—plastics, for the Organic Chemicals Division of the Food Machinery and Chemical Corp.

Bernard J. Davis has been named manager of the new district office formed at New Orleans, La., by the Pennsylvania Industrial Chemical Corp.

W. James Sears, vice-president of the Rubber Manufacturers Association, has been elected president of the Washington Post of the American Ordnance Association.

John P. Hyde has been promoted to the newly created position of operations manager for the Silicate, Detergent, Calcium Division of the Diamond Alkali Co.

Matthew J. Babey has been named sales and technical service representative for the New York City greater metropolitan area by Atlas Electric Devices Co., Chicago, Ill.

John T. Ingram, Jr. has been appointed technical representative for the Surface Coatings Division in the Cleveland District Office by the Bakelite Co.

Chicago Hears Morton on Rubber Research

► The April 26th meeting of the Chicago Rubber Group held at the Furniture Mart in Chicago, Ill., featured a presentation of diplomas to all students who had successfully completed the group's course in rubber technology. The meeting also featured an address by Dr. Maurice Morton, Director of the Institute of Rubber Research and Professor of Polymer Chemistry at the University of Akron. Dr. Morton spoke on "A Century of Rubber Research."

The speaker observed that the recent announcements of the successful duplication of the molecular structure of hevea rubber mark the culmination of a century of rubber sesearch. Although the practical utilization of rubber generally started with the discovery of vulcanization by Goodyear and Hancock, independently, around the year 1840, the first chemical knowledge about rubber dates back almost exactly 100 years ago. It was Greville Williams, in 1860, who is credited with first isolating and identifying isoprene from the pyrolysis of rubber. However, he, together with subsequent workers, soon found that the reverse reaction, viz. polymerization of isoprene, never yielded the natural product. They could advance no good reason for this, since basic knowledge concerning the molecular structure of rubber was not yet available.

Early Work on Hevea

However, even as early as 1902, some understanding of hevea structure was beginning to come through. Weber at that time postulated this material as a "polyprene", consisting of groups of isoprene units. Staudinger, in 1922, suggested the existence of a rubber *macromolecule*, consisting of a long-chain polyisoprene. However, it was largely the X-ray work by Mark and Meyer in 1928 that finally shed light on the perplexing problem of duplicating the natural rubber molecule. Their discovery of the cis-trans specificity in hevea and gutta percha led to the only plausible explanation of the difference between natural rubber (cis-1, 4-polyisoprene) and the synthetic polyisoprenes, which were copolymers of all possible structures (cis- and trans-1, 4, as well as 1, 2 and 3, 4).

Actually it was not possible at that time to fully elucidate the chain structure of the synthetic polydienes, since x-ray analysis could only apply to elastomers which crystallized sufficiently on stretching to yield a diagram. The synthetics did not possess sufficient chain regularity to yield an x-ray pattern on stretching, hence they were known to be irregular, but no one knew just how irregular!

The introduction of infra-red spectroscopy techniques to the field of polymers during the last 10-15 years finally provided a powerful tool for the complete elucidation of chain structure. With this knowledge, a better correlation was available between the polymerization reaction and the resulting polymer structure. In this way the action of the new and unique catalysts (such as lithium and the Ziegler catalyst) in controlling the chain structure of polyisoprene was capable of being recognized and led to the discovery, by several groups of American workers, that these catalysts lead to a polymer containing better than 90% of the cis-1, 4-polyisoprene.

This provides another example of the fact that although discoveries cannot always (or ever) be planned, they invariably depend upon a researcher's imagination, coupled with sufficient background knowledge for him to recognize what he finds, Dr. Morton concluded.

A. E. Bailey

F. T. Hults

Copolymer Names New Sales Representatives

► Copolymer Rubber and Chemical Corp., Baton Rouge, La., has announced the appointment of several sales representatives. A. E. Bailey will serve the New England area from headquarters at Hartford, Conn. F. T. Hults will cover the Middle Atlantic States and will be located in Philadelphia, Penna. M. D. Morris and B. G. Hutchison will handle the Great Lakes and Midwest regions, for the company, with headquarters in Akron, Ohio, and Chicago, Ill., respectively.

M. D. Morris

B. G. Hutchison

► E. I. du Pont de Nemours & Co., Inc., has announced price reductions up to 44 per cent on adhesives for Mylar polyester film. Prices of liquid polyester solutions in drum lots are reduced from nine to 34 per cent in a range of six types, and solid polymers of four types cut from 32 to 44 per cent.

Financial News

Dayton Rubber

► Six months to April 30: Net income of $917,205, which is equal to 95c a share, compared with $1,093,299, or $1.29 a share, in the corresponding six month period of the preceding year. Sales totaled $37,356,158, against $34,321,742 in the six months ended April 30, 1956. According to the company, increased selling and merchandising costs accounted for the decline in the company's earnings for the period.

Firestone Tire

► Six months ended April 30: Net income of $28,430,380, which is equal to $3.44 a share, compared with $27,140,605, or $3.33 in the same period last year. Sales in the six months to April 30 totaled $550,422,328, a gain of 3.4 per cent over $532,070,658 for the corresponding six months of the previous fiscal year.

Lee Rubber & Tire

► Six months to April 30: Net income of $713,587, which is equal to 84c a share compared with $736,495, or 86c a share, in the same period last year. Sales and other income amounted to $21,835,444 in the six months to April 30, compared with $21,513,912, in the corresponding period of the preceding year.

Wooster Rubber

► Six months to March 31: Net income of $461,170, which is equal to 40c a share, compared with $678,659, or 63c a share in the equivalent six month period of the preceding year. Sales in the six months to March 31 totaled $9,868,699, compared with $10,078,885 in the same period the year before.

A. G. Spalding & Bros.

► Six months to April 30: Net income of $473,000, which is equal to 78c a share, compared with $155,000, or 27c a share in the same period last year. Results for the 1956 period include the Rawlings Division from December 9, 1955, date of acquisition.

Belden Manufacturing

► Quarter to March 31: Net income of $422,745, which is equal to $1.08 per share, compared with $481,148, or $1.24 a share, in the same period of the preceding year.

United Carbon

► Quarter to March 31: Net income of $1,574,469, which is equal to $1.32 a share, compared with $1,558,518, or $1.31 a share, in the corresponding quarter of 1956.

Minnesota Mining

► Three months to March 31: Net income of $9,762,181, which is equal to 58c per common share, compared with $8,704,518, or 52c a share, in the first quarter of 1956. Sales in the 1957 quarterly period totaled $89,475,428, compared with $75,706,190 in the corresponding period of 1956.

U. S. Rubber

► Three months to March 31: Net income of $8,179,761, or $1.25 a common share, compared with $9,103,348, or $1.41 a share, in the corresponding period of the preceding year. Sales in the first quarter of 1957 totaled $232,224,961 compared with $229,649,654 in the first three months of 1956.

New Jersey Zinc

► Three months to March 31: Net income of $1,177,218, which is equal to 60c a common share, compared with $1,175,475, or 60c a share, in the first quarter of the preceding year. Sales in first three months of 1957 totaled $5,740,-864 compared with $5,659,414, in the corresponding period of 1956.

Columbian Carbon

► Quarter to March 31: Net income of $1,631,838, which is equal to $1.01 a common share, compared with $1,761,453, or $1.09 a share in the first quarter of 1956. Sales in the 1957 quarterly period totaled $19,331,542, compared with $16,756,550 in the first three months of 1956.

Midwest Rubber Reclaiming

► Six months to April 30: Net income of $367,232, which is equal to $1.24 a common share, compared with $405,512, or $1.33 a share, in the previous year. Sales in the six month period to April 30 totaled $4,725,261 compared with $4,775,804 in the same period last year.

Brunswick-Balke-Collender

► Quarter to March 31: Net income of $136,177, which is equal to 20c a common share, compared with a net income of $107,105 in the 1956 three month period. Sales in the first quarter of 1957 totaled $19,159,530 compared with $6,920,070 in the corresponding period last year.

Clevite

► Quarter to March 31: Net income of $1,656,000, which is equal to 88c a share, compared with $738,000, or 37c a share, in the corresponding period of 1956. Net sales totaled $20,234,000 in the first quarter of 1956 compared with $18,592,000 in the same period of the preceding year.

Goodall Rubber

► Quarter to March 31: Net income of $143,054, which is equal to 30c a common share, compared with $158,710, or 34c a share, in the same quarter last year. Sales for the 1957 quarterly period totaled $2,982,530 compared with $2,923,539 in the first three months of 1956.

Tyer Rubber

► Year to February 28: Net income of $244,445, which is equal to $2.22, compared with $221,705, or $2.00 a share, in the previous fiscal year. Sales in fiscal 1956 totaled $7,914,826 compared with $6,747,887 in the preceding year.

Thermoid

► Quarter to March 31: Net income of $309,805, which is equal to 34c a common share, compared with $377,617, or 42c a share, in the same period of the preceding year. Sales in the first quarter of 1957 totaled $9,652,801 compared with $9,417,871 in the first quarter of 1956.

Rome Cable

► Fiscal year to March 31: Net income of $2,255,819, which is equal to $4.04, compared with $2,023,070, or $3.82 a share in fiscal 1956. Sales last year amounted to $52,790,055, compared with $56,996,682 in the preceding fiscal year.

Barry Controls

► Five months ended May 31: Net income of $106,000 compared with $76,000 in the first five months of 1956. Sales in the first five months to May 31 totaled $2,120,000 compared with $1,654,000 in the same period of the preceding year.

Mansfield Tire

► Quarter to March 31: Net income of $214,694, which is equal to 32c a common share, compared with $309,202, or 49c a share, in the first quarter of the preceding year.

Anaconda Wire & Cable

► Quarter to March 31: Net income of $1,755,684, which is equal to $2.08 a share, compared with $2,644,205, or $3.13, in the same period of the previous year.

St. Joseph Lead

► Quarter to March 31: Net income of $2,757,042, which is equal to $1.01 per common share, compared with $2,945,748, or $1.08 a share, in the preceding year.

Servus Rubber

► For 1956: Net income of $548,716, which is equal to $1.43, compared with $352,281, or 92c in 1956.

J. Ward Keener

Named Goodrich President

► J. Ward Keener, formerly executive vice-president, has been named president of the B. F. Goodrich Co., Akron, Ohio, effective August 1, succeeding William S. Richardson, who is retiring but who will remain a director of the company. Goodrich also announced that Reuben B. Robertson, Jr., former Deputy Secretary of Defense, has been renamed to the board after a two year leave of absence. Mr. Robertson left the company in July, 1955 to take the Pentagon post. Mr. Keener, who formerly taught business administration at Ohio Wesleyan University, joined Goodrich in 1937 as a research analyst. He served successively in marketing research, as director of business research, assistant to the financial vice-president and assistant to the president. In 1946, he was elected vice-president of employe relations and in 1950, he became vice-president with corporate staff responsibilities. He has been executive vice-president for the past year with operating responsibility for several of the company's divisions. Mr. Keener is a director of the University of Akron and a trustee of Akron City Hospital. He was adviser to the State Department at meetings of the International Rubber Study Group in 1947, 1950 and 1955. He served on the National Wage Stabilization Board during the Korean war and received the Army's Medal for Outstanding Civilian Achievements last year for his service in 1955 and 1956 as a member of the Secretary of the Army's Civilian Personnel Advisory Committee.

Produces Racing Tire

► A special purpose tire, constructed for use at the June 29 International 500 mile race at Monza, Italy, has been developed by the Firestone Tire and Rubber Co., Akron, Ohio. Said to perform well under the fastest speeds ever driven on a closed track, the special "Monza Tire" was constructed of tough, wear-resistant compounds that run comparatively cool even at super speeds. The tire was built with a special tread design to resist skidding.

Machinery Firms Merge

► Universal Hydraulic Machinery Co., New York, N. Y., and the Johnson Machinery Co. of Newark, N. J., have been consolidated, effective July 1. The merger was announced on June 25 by Mrs. Irma Sacks and Mayer A. Rubenstein, presidents, respectively, of the two concerns.

As a result of the merger, the companies, which specialize in used and rebuilt plastic, hydraulic, rubber and processing machinery, will have available the largest stock of this type equipment in the United States as well as competent technical and engineering assistance. Johnson Machinery was founded in 1921 and in 1953, a separate machinery department for plastics, hydraulics and allied equipment was established under the direction of H. M. Newman. Universal Hydraulic was established in 1921 and has been under the active management of Mrs. Sacks since 1942. The combined organizations will operate out of Johnson's 16,000 square foot Newark plant, which includes sales, rebuilding facilities and show room. In addition, 62,000 square feet of storage space is maintained next to Newark Airport to house the combined inventories.

Appointed Factory Manager

► Howard K. Norris has been appointed factory manager for the power transmission belt plant of the U. S. Rubber Co. in the Tacony area of Philadelphia, Penna. Mr. Norris, formerly assistant manager of the plant, has been associated with the company since 1940. A graduate of the University of Illinois, he spent four years in the company's Tire Division and then was appointed purchasing agent for a wire-making plant then operated by the company in Lowell, Mass. In 1945 he became purchasing agent for the Tacony plant, and five years later was named head of the plant's Sales-Production-Coordination Department. In late 1950 he was appointed administrative assistant to the manager of the Mechanical Goods Division's main plant in Passaic, N. J., and in 1953, he returned to the Tacony plant as assistant factory manager. In his new post he will report to W. A. Armstrong, the division's production manager.

Offers Custom Molded Parts

► Stillman Rubber Co., Culver City, Calif., has announced the availability of small-sized custom molded rubber parts for aircraft and missile applications in superior synthetic rubber compounds. The company produces precision parts of unusual configurations to extremely close tolerances, including very small shapes where accurate dimension and smooth surfaces are essential. According to the company, the custom molded parts have excellent heat aging properties and low temperature flexibility and can withstand temperature extremes as low as minus 100°F. and as high as plus 500°F. Special compounds are resistant to aromatic fuels, hydraulic oils, non-flammable hydraulic fluids, lubrication oils, solvents, alcohols and most dilute acids and alkalis.

Richard V. Thomas

Promoted by Goodyear Tire

► Richard V. Thomas, former manager of the Los Angeles plant of the Goodyear Tire & Rubber Co., has been appointed assistant to Russell DeYoung, executive vice-president of production for Goodyear International Corp. Mr. Thomas is succeeded by Marshall F. Gillespie, former Los Angeles Division A superintendent. Mr. Thomas joined Goodyear's lighter-than-air craft division in 1943. Following squadron and staff training assignments, he served as shift foreman and foreman in company plants until 1950, when he was named to serve as Tire Division superintendent of the company's newly established plant at Colmar-Berg, Luxembourg. In 1952, he was transferred to Los Angeles as assistant plant manager and was appointed plant manager three years later.

Mr. Gillespie, associated with Goodyear for 27 years, was in the production squadron until 1937 and after various assignments became manager of squadrons in 1943. He was transferred to the company's plant at Wolverhampton, England, as division superintendent in 1945. In 1951, Mr. Gillespie was named manager of the Luxembourg plant and in 1953, he was sent to South Africa to manage the Goodyear production facility at Uitenhage. He returned to the United States in 1956 and was assigned to duties as superintendent of Division A at Los Angeles.

Cornwell Named President

► R. E. Cornwell, formerly vice-president, has been appointed president of Union Carbide Development Co., a division of Union Carbide Corp., New York, N. Y., succeeding Birny Mason, Jr., who has been named vice-president of the parent company. Mr. Cornwell began with Union Carbide in 1923 and has held key engineering posts with both Linde Co. and Union Carbide Chemicals Co., both divisions of the corporation. For the last twenty years his work has been concerned principally with the development of welding processes.

West Coast News

► According to figures released recently, the Los Angeles tire plant of the U. S. Rubber Co. has set the best safety record in the tire industry in 1956. While the plant took first honors for operating the entire year without a lost-time accident, its safety record actually began on August 4, 1955 and ran to February 2, 1957. During this period, the plant worked a total of 6,711,838 man-hours without a lost-time accident, the second longest safety record in the history of the tire industry in this country.

For its 1956 performance, the plant won first prize among the larger plants in the National Safety Council's rubber section. An NSC award of honor also went to the plant. The Greater Los Angeles Safety Council gave first prize to the U. S. Rubber plant for the best safety performance in its area. In setting its record, the L. A. plant collected the greatest number of safety awards ever won in one year by a U. S. Rubber plant.

Besides a special certificate of commendation to Ben S. Adams, factory manager, from H. E. Humphreys Jr., president, the tire plant also picked up first prize in the large plant section of U. S. Rubber's company-wide safety contest, and won the general manager's prize for best safety performance among the tire division's five plants.

First place in the company's fire prevention contest also went to the L. A. plant, making it the first time a plant won both the company's fire prevention and safety contests in the same year. The L. A. plant won for being the largest plant without having a fire causing more than $25 worth of damage in a year.

► The 1957 Hargi Outing, which was held on June 11 at Las Vegas, had 323 members and guests in attendance. Several contests were conducted during the day. In the tennis matches, Bernie Hodowski and Dr. E. G. Partridge won first place honors while Wendell Higbee and Burton Smart placed second. Ranking first in the Golf contest were Don Montegomery, with a low net, and Chick Hart, with a low gross score. Second place honors went to William Lhamon, with a low net and Al Federico, with a low gross. For the longest drive, Al Durnerin ranked first; Bob Short, second, and John Campbell, third. The swimming contest consisted of an individual medley, with Bob Kavish in first place and Bill Wadt in second place. Bob Luskin and John Arensmeyer won the Ping Pong Contests, with Tom Abbate and John Grant in second place. Winners of the Quoits games were Al Marone and Stan Freeman, followed by Russ Nagel and J. Calderon. John McSparren took first place honors in the Darts competition, while George T. Shaffer, John Higgins, and Carl Erikson, placed second, third and fourth, respectively. The three Legged race was won by Tom Pollard and Frank Long, followed by Art Ireland and Phil Ramos. The winning team in the water polo contest consisted of Andy Mitchell, Zillie Polumbo, Paul Holden, Doc Chaffee, and W. P. Ruemmler.

► Raybestos-Manhattan, Inc., Passaic, N. J., has purchased the Graef Engineering Co., Paramount, Calif. John F. D. Rohrback, president of Raybestos-Manhattan, said the transaction involved cash and stock, but did not disclose the amount. Graef Engineering will be operated as the Pacific Coast Division of the company and will manufacture products such as tubes, sheets and rods for the aircraft, automotive and electrical engineering industries.

► Mitchell Rubber Products, Inc., Los Angeles, Calif., is building a new $300,000 plant at its present location.

► W. J. Voit Rubber Corp. has announced the transfer of Floyd Price and Al Deweese to Portland, Ore., to manage the company's tread rubber plant. Neil McIntyre has been shifted to the Los Angeles plant on special assignment.

► Bernard Cohen has been transferred from the Hastings-on-Hudson, N. Y., plant of the Anaconda Wire & Cable Co., to the company's plant at Orange, Calif., where he has succeeded Ed Wray as chief chemist.

Takes Judgment Action

► The split in the partnership of Sydney L. Albert and Edward J. Harris was further widened on May 16 when Mr. Harris took judgment for $263,036 against the firm of Albert-Harris, Inc., on a series of cognovit notes. Mr. Harris went into Common Pleas Court in Akron to demand payment on loans which were overdue. Cognovit notes confess judgment automatically if unpaid at the end of the term. In one suit, Mr. Harris took judgment personally against Albert-Harris for $87,409 on a single promisory note. In the other suit, Goodride Tire Co., of which Mr. Harris is president, took judgment against Albert-Harris for $175,627.28. The latter is made up of 22 cognovit notes running for 30 to 90 days. They range from $1,000 to $20,000 and were given between June, 1956, and April 8, 1957. Also on May 16, a firm of Akron attorneys representing Albert-Harris, filed a motion at Common Pleas Court asking that the judgments sought by Mr. Harris be set aside. The motion contended that Albert-Harris was not indebted to Mr. Harris for any sum; that the judgments were taken without due notice to the defendant, and that the notes were executed without prior authority. A hearing on the motion was to have been held on June 8.

Carl H. Totsch

Totsch Named Vice-President

► Carl H. Totsch has been elected a vice-president of the Midwest Rubber Reclaiming Co., East St. Louis, Ill. In addition, he will continue in his present capacity as sales manager. Mr. Totsch, associated with the organization since January 1946, began in the Purchasing and Traffic Department and in March of the same year, he was transferred to the Barberton, Ohio plant as purchasing agent and traffic manager. Two years later he was assigned to sales work covering Ohio, Indiana, Michigan, Pennsylvania and West Virginia. In December, 1950, Mr. Totsch was appointed assistant sales manager and returned to the firm's East St. Louis plant. He was promoted to sales manager in 1951. Mr. Totsch is a member of the American Chemical Society. The company has also announced that Howard R. Erwin, manager of the Paramount, Calif., plant, has been elected a member of the board of directors. A former deputy director of the Office of Synthetic Rubber in Washington, D. C., Mr. Erwin joined Midwest Rubber Reclaiming in 1955 when the government rubber plants were sold.

Hoel Retires From Sun Oil

► Dr. Archie B. Hoel, noted authority on rubber processing oils, retired from the Sun Oil Co., Philadelphia, Penna., on July 1. Dr. Hoel, special technical representative, had been associated with Sun since 1933 and dealt with the development and uses of petroleum derivatives in the processing of rubber, leather, textiles, plastics and printing inks. Prior to joining Sun, he served as a research chemist at the Atlantic Refining Co. for eleven years. Dr. Hoel received a B. A. degree in chemistry from the University of Montana and a doctorate degree from Cornell University in 1921. During World War I, he served as a sergeant in the Ordnance Department. Dr. Hoel is a member of the American Chemical Society, the American Leather Chemists Association, the Division of Rubber Chemistry, Alpha Chi Sigma and Sigma XI, professional fraternities and Sigma Chi, social fraternity.

William E. Kavenagh

Appointed Huber Consultant

► William E. Kavenagh, formerly associated with the Goodyear Tire & Rubber Co., Akron, Ohio, has joined the J. M. Huber Corp., New York, N. Y., as consultant. Goodyear's first rubber compounder, Mr. Kavenagh was observing automobile tire performance in England as early as 1902. During the early 1940's, he received the Paul W. and Florence B. Litchfield Award of Merit for his part in the development of Neolite.

Unit to Serve Industry

► Union Carbide Chemicals Co., New York, N. Y., has approved plans to build a technical service laboratory, on its Westchester County property near Tarreytown, N. Y., scheduled to be completed early in 1959. To include facilities and personnel to serve a total of 24 major industries, the laboratory will provide technical service and application research to the chemical industry. The facility will be located on a 280-acre site and will have 63 individual laboratory units. Complete analytical facilities with provisions for tracer chemistry will be included in a three story structure, 360 by 60 feet. Glass will be used extensively on exterior walls to provide maximum natural light. A 200 seat auditorium has also been planned for seminars and other technical meetings.

Gala Xmas Party Planned

► The New York Rubber Group has announced that its Annual Xmas Party, scheduled for December 13, will be held at the Latin Quarter in New York City. This is the first time in about twenty years that the group will hold its year-end meeting in a night club. Members and guests will witness the regular floor show and partake of a gala dinner. Additional details will be announced at a future time.

Plans Adhesives Facility

► B. F. Goodrich Industrial Products Co., Akron, Ohio, has announced plans for the construction of a specialized plant in Akron for the manufacture of adhesives. Located on the main plant property of the B. F. Goodrich Co., the new plant, which will cost approximately $2,500,000, represents the first major expansion of production facilities in Akron by the company since the construction of the belt plant in 1950. Adhesives requirements of Goodrich manufacturing in Akron and facilities to meet growing demands of commercial customers will be provided by the new unit. The two story structure will have 70,000 square feet of floor space. Lexsuco fire retardant roof construction, made with Goodrich Koroseal vapor barrier and adhesives will be utilized in the roofing. Housing production facilities and a development laboratory, the plant is scheduled for completion in 1958.

Porter Buys Thomas Firm

► H. K. Porter Co., Inc., New York, N. Y., has announced the acquisition of R. Thomas & Sons Co., Inc., Lisbon, Ohio. The second recent acquisition in the electrical manufacturing field for Porter, the Thomas operation has been combined with Porter's Delta-Star Electric Division. On April 23, the company acquired Federal Wire & Cable Co., Ltd., Guelph, Ont., Canada. R. Thomas & Sons, manufactures electrical porcelain used in connection with transmission lines, outdoor substations and specialty porcelain used by electrical equipment manufacturers. Sales for the Thomas Works, as the company is to be known, are to be combined with the national sales organization of Delta-Star.

Robert T. Cartlidge

Named Rubber Plant Manager

► Roland T. Cartlidge has been appointed manager of the rubber plant of the De Laval Separator Co. at Poughkeepsie, N. Y. A rubber chemist, Mr. Cartlidge joins De Laval with a background of over 24 years' experience.

Fred M. Stefan

Joins Marbon Chemical

► Fred M. Stefan has been appointed executive vice-president of the Marbon Chemical Division of the Borg-Warner Corp. Mr. Stefan was previously associated with Swedlow Plastics Co. as vice-president and division manager of eastern operations at Youngstown, Ohio. Prior to joining Swedlow, Mr. Stefan served with George Fry & Associates, a consulting firm located in Chicago, Ill.

Develops Stronger Rayon

► American Viscose Corp., Philadelphia, Penna., has announced the development of "Avisco XL", a new, high-strength staple fiber said to be the greatest improvement in rayon since the invention of the material. Yarns in the new staple are 70 per cent stronger when wet and 40 per cent stronger, dry, than conventional rayons, the company says. The new fiber has broad market applications in industrial uses as well as in apparel and home furnishings, a company spokesman said. He added that Avisco XL fabrics have 25 per cent more breaking strength and 33 per cent more tear strength than cotton of comparable construction and weave. Because of increased extensility, the new fiber is believed to be compatible with the acrylics and polyesters, indicating applicability to new, lighter-weight, minimum care fabrics with the draping characteristics of regular rayon.

Reaches Million Ton Milestone

► Firestone Tire & Rubber Co., Akron, Ohio, has announced that the company's Lake Charles, La., plant produced its one-millionth ton of synthetic rubber on May 20. The record production was achieved under a stepped-up program of operations put into effect by the company which took over the plant in 1955. The plant is now capable of producting 190,000 tons of synthetic a year, 90 per cent more than the originial capacity in 1942. The Lake Charles plant is one of two synthetic rubber plants operated by Firestone. The company's other synthetic rubber plant is located in Akron, Ohio.

Canadian News

► Names of the 13 newly-elected councillors of the Chemical Institute of Canada were announced in Vancouver, B. C., on June 3 at the 40th Annual Conference of the Institute. Each year one-third of the 36 councillors of the Institute retire and general elections are held to replace them. The Council is the national policy-making body of the Institute. Nine of the councillors represent the members from various areas of Canada. These are: J. R. Dingle, physical chemist, Atlantic Technological Station, Fisheries Research Board, Halifax, N. S.; A. Cholette, professor of chemical engineering, Laval University, Quebec, Que.; P. L. Trembley, manager, Eastern Division, Shell Oil Co. of Canada, Ltd., Montreal, Que.; W. V. H. Bowerman, development supervisor, DuPont Co. of Canada (1956), Ltd., Maitland, Ont.; E. W. Warren, chief chemist, Canadian Steel Improvement, Ltd., Toronto, Ont.; A. A. Sheppard, senior chemist, Inspection Laboratory, Imperial Oil, Ltd., Sarnia, Ont.; I. Hlynka, section leader, basic wheat chemistry research, Grain Research Laboratory, Board of Grain Commissioners for Canada, Winnipeg, Man., and W. A. Bryce, associate professor, Department of Chemistry, the University of British Columbia, Vancouver, B. C.

The other four councillors were elected to represent the membership - at - large. They are: H. Favre, assistant professor, organic chemistry, University of Montreal, Que.; C. C. Lucas, professor, Banting and Best Department of Medical Research, University of Toronto, Toronto, Ont.; W. B. van Alystyne, Jr., vice-president for operations, Merck & Co., Ltd., Montreal, Que., and L. Yaffe, associate professor, Department of Chemistry, McGill University, Montreal, Que.

► Canadian Celanese Ltd. has made its second major move in the rubber products line. The move involves the acquisition of machinery, process material, know-how and trade names of Rayflex Co. of Canada Ltd., a subsidiary of Rayflex, Inc. of the U. S. Canadian Celanese will produce under license from the U. S. firm rubber-covered fabrics for foundation garments and bathing suits for sale in Canada. The company has taken over the rented building at Drummondville, Que., where the U. S. subsidiary has been operating.

The move is a development growing out of Canadian Celanese's acquisition of the assets of Coaticook Textiles Ltd., a wholly-owned subsidiary of Silknit Ltd., 120 miles east of Montreal, last July. Acquired last summer, the Coaticook operation has been streamlined, more machinery installed, and produces woven, knitted and elastic celanese fabrics.

► Formation of a new Canadian chemical company was announced here recently by William Wishnick, executive vice-president of the Witco Chemical Co. The new company, Witco Chemical Co. Canada, Ltd., has been organized to manufacture and sell basic industrial chemicals throughout Canada. Initial sales will be in chemicals for the rubber, paint, plastics and allied industries. The company plans to locate a Toronto office soon and has already acquired approximately six acres of land in Trafalgar Township, southwest of Toronto, where it will locate a future manufacturing plant. Officers of the Canadian firm are: William Wishnick, president and treasurer; S. M. Freeman, executive vice-president and H. B. Seligman, vice-president.

► Appointment of W. D. Watson as sales promotion and development representative for elastomers has been announced by DuPont of Canada. His headquarters will be in Toronto where he succeeds John A. Enns who has transferred to the company's Research and Development Department in Montreal. A native of Brock, Sask., Mr. Watson is a graduate of the University of Saskatchewan and joined the company in 1948. He held the position of agricultural chemical sales representative for Manitoba and Saskatchewan until his present appointment.

► R. A. Woodrow has been appointed personnel manager of B. F. Goodrich Canada, Ltd. Mr. Woodrow has been with Goodrich since 1954 as employment interviewer and recently as supervisor of employment and salary administration. A graduate of the University of Western Ontario, he has done post-graduate psychology at the University of Detroit.

► W. H. Funston, president of the Firestone Tire & Rubber Co. of Canada, Ltd., has announced the appointment of J. J. Taylor to the newly formed Chemical Sales Division in Hamilton, Ont. Mr. Taylor will be responsible for the market development and sale of the Firestone line of polyvinyl chloride resins and compounds which are marketed under the trade name "Exon." The extensive lines of resins and compounds, developed by Firestone Plastics Co., will be offered to Canadian manufacturers of floor tile, insulated wire, coatings, lacquers, molded and extruded products, etc.

Mr. Taylor holds a masters degree in chemistry from the University of Western Ontario, and served on the staff of the university for a time before entering industry. Mr. Taylor's broad knowledge of synthetic resins and compounds has been gained through his extensive experience while holding laboratory supervisory positions with two of the largest processors of plastic materials in Canada prior to joining Firestone.

Dr. E. N. Learner

Appointed Sales Representative

► B. F. Goodrich Chemical Co., Cleveland, Ohio, has announced the appointment of Dr. Edward N. Learner as sales representative for general chemicals. Formerly senior product engineer in charge of biochemical sales development, Dr. Learner joined Goodrich in 1952 after receiving his doctorate from Michigan State University. He was assigned to the Boyce Thompson Institute in Yonkers, N. Y., where the company then engaged in biochemical and agricultural research. In 1953, Dr. Learner was transferred to the Goodrich Research Center in Brecksville, Ohio, in a similar research position. Dr. Learner joined Goodrich Chemical as a technical representative in February, 1955 and was named senior product engineer the following June. He is a member of the American Institute of Biological Scientists, The American Society for Plant Physiologists and Sigma Xi scientific honorary.

► A contract for construction of the major building in a specialty latex handling plant has been awarded by the Polymer Corp. to cover a total cost of $190,552. Polymer has already cleared the site and poured the foundations, so that construction of the building may begin immediately after the steel erection. This addition to the Polymer plant will be located immediately north of the copolymer unit and will be constructed of brick combined with transite. Three stories high and approximately 100 feet square, it will contain the processing area, office space, lunch and locker room conveniences for employees, and a loading area which includes a railway spur line through the west end of the building. This will permit improved loading facilities for tank cars carrying latex. In addition, space has been provided for washing tank cars. The processing area will utilize automatic equipment and it is expected that a minimum staff of five to eight men per shift will be needed.

Acquires Interest In Gro-Cord

► Chase & Sons, Inc., North Quincy, Mass., recently acquired a controlling interest in Gro-Cord Rubber Co., Lima, Ohio. Gro-Cord Rubber Co. of Canada, Ltd., Tillsonburg, Ont., Canada, wholly-owned by Gro-Cord Rubber Co., and Alfred Hale Rubber Co., Inc., will continue to operate as subsidiaries.

In announcing the change of stock ownership, Francis Chase, president, said that the acquisition will give Chase improved manufacturing and distribution facilities throughout the entire United States and Canada for the company's expanding line of electrical insulating materials. In addition, the acquisition will make immediately available to Chase and Gro-Cord the advantages of diversification and expanded resources and facilities. The new association will add to Gro-Cord's strength and assure its ability to handle large scale commitments and maintain capacity production for prompt delivery to meet the needs of the shoe industry.

Francis M. Chase will be board chairman and vice-president of Gro-Cord, Edward L. Chase will be treasurer and E. Edward Colligan, director. Forest Moor will remain as Gro-Cord president. The companies plan to continue present methods of distribution and representation of Gro-Cord products. All manufacturing of these products will continue to be centered in the Lima, Ohio and the Tillsonburg, Ont., plants. Laboratory and research facilities will be available to Gro-Cord to assure continued progress in product development. The present Gro-cord line of workshoe soles and heels will be expanded to include new types of materials.

MCA Releases New Facts Book

► Manufacturing Chemists' Association, Inc., Washington, D. C., has released the third edition of *The Chemical Industry Facts Book*, a 160-page reference work on the chemical industry. The book, which contains 15 chapters, said to deal with virtually every facet of the industry, is illustrated with charts, graphs and tables. About 100,000 copies will be distributed either by chemical companies or directly by the MCA. It is anticipated that one of the principal uses of the Facts Book will be as a supplementary text and reference work in schools and colleges. A 20-page Teacher's Guide, prepared by Dr. John S. Richardson, president of the National Science Teachers Association, is available free to educators for use with the Facts Book. Single copy price of the *Chemical Industry Facts Book* is $1.25, postage prepaid. Discounts are available on bulk quantities.

Ruhm Elected President

► Herman D. Ruhm, Jr., has been elected president of Wellington Sears Co., New York, N. Y., succeeding T. Scott Avary who has been elected vice-chairman. Mr. Ruhm resigned as president of Burlington Industries, Inc., New York, N. Y. on May 1. Previously he was president of the Bates Manufacturing Co.

Frederick Marchionna

Opens Consulting Office

► Frederick Marchionna, associated with the U. S. Patent Office for thirty-three years, will open a consulting office devoted to rubber and resins upon his retirement from government service on July 31. The office will be located at 4816 47th St., N.W., Washington 16, D.C. During his term of service at the Patent Office, Mr. Marchionna has been concerned with the examination of patents for the production of natural and synthetic rubbers. He has also been active in the fields of synthetic resins, plastics, pigments and fillers. In addition to his work at the Patent Office, Mr. Marchionna is the author of "Latex and Rubber Derivatives" published in three volumes by RUBBER AGE, and "Butalastic Polymers", published by the Reinhold Publishing Co.

Plans Textile Facility

► Construction of a new textile processing plant is planned by the B. F. Goodrich Co., Akron, Ohio, on a 20 acre site recently purchased in Exeter Borough, Luzerne County, Penna. Scheduled to start manufacturing operations in 1958, the modern plant will have 80,000 square feet of floor space and involves a large investment in machinery and equipment. Rayon and nylon tire cord used in tire construction in the company's five tire plants in the United States will be processed in the new plant. Textile operations which Goodrich has been conducting in a leased building in Wilkes-Barre for more than 10 years will later be transferred to the Exeter location, the company says. The decision to locate a plant in the Wyoming Valley area was based in the company's favorable experience in Wilkes-Barre and the availability of adequate water, power, railroad and highway service and facilities, the company claims.

Coffin Succeeds Hinshaw

► Goodyear International Corp., Akron, Ohio, has announced that Laurence H. Coffin, formerly assistant to George K. Hinshaw, vice-president in charge of production operations at foreign plants, has been named to succeed Mr. Hinshaw, whose retirement became effective on June 30. Mr. Hinshaw completed his fortieth year of continuous service with the company on June 11. Mr. Coffin, associated with Goodyear foreign operations for more than 27 years, joined Goodyear's Development Department in 1927 following completion of mechanical engineering degree requirements at Massachusetts Institute of Technology. In 1930, he became manager of technical service at the company's Hurlingham, Argentina plant and in 1939, he was named development manager at the Goodyear plant in Sao Paulo, Brazil. He managed the plant from 1942 until 1947, when he returned to Akron as assistant to Mr. Hinshaw. Mr. Hinshaw, retiring vice-president, joined Goodyear in 1917 as a member of the company's Chemical Department. He has held many posts and during his 18 years as vice-president in charge of production, Mr. Hinshaw figured prominently in the expansion of Goodyear's foreign operations from nine to 20 plants. In this capacity, he has travelled thousands of miles on periodic inspection tours of the corporation's world-wide manufacturing facilities.

Appoints Four Supervisors

► Taylor Instrument Co., Rochester, N. Y., has announced four appointments to newly created supervisory positions in the Application Engineering Department. The new posts were made necessary by greatly increased activity in this phase of the business. John E. Barber has been named assistant department manager reporting to George E. Howard, manager. Mr. Barber has been in application engineering since he joined the firm in 1946. He is a specialist in the application of automatic control equipment in the processing of food, beverages and textiles. Appointed group leaders are Eliott M. Barr, Donald T. Gregg and Henry Stoll. Mr. Barr will handle application of electronic and electric contact instruments. In addition to several lines of control instruments, Mr. Gregg will head instrument applications in the rubber, power, textile and food industries. Mr. Stoll, a flow expert, will handle departmental responsibilities for for the chemical, paper and petroleum industries.

Completes Petrochemicals Unit

► Chemical Division of the Delhi-Taylor Oil Corp., Corpus Christi, Texas, has announced that its new petrochemicals plant went on stream July 1. The $4 million plant, which is located in Corpus Christi, has ample facilities for water shipment. The Udex extraction unit has a capacity of 45,000,000 gallons per year. Initial production will include benzine, toluene and xylene.

Obituaries

John B. Dickson

► John B. Dickson, retired technical analyst for the Textile Division of the U. S. Rubber Co., New York, N. Y., died on June 24 in the Medical Arts Center after a brief illness. He was 67 years old. Born in Zanesville, Ohio, Mr. Dickson obtained a B.S. degree at Ohio University and a Master of Arts degree at Ohio State University. Later, he studied at the Massachusetts Institute of Technology. Mr. Dickson entered the chemical research field in 1919 as head of a physical-chemical research unit of the B. F. Goodrich Rubber Co. After four years in that position, he joined A. G. Spalding & Bros. as technical director at Chicopee, Mass., where he remained for eighteen years. In 1942, he joined U. S. Rubber as director of a textile research unit and later became a technical analyst for the Commercial Department of the corporation, before moving to the Textile Division.

Mr. Dickson served as a captain in the Army Chemical Warfare Service in World War I, and as a part-time consultant to the office of the Army Quartermaster General in World War II. For this latter service, which he continued for five years after the end of the war, he received an Army Certificate of Appreciation. Following his retirement, two years ago, Mr. Dickson served as technical consultant for several concerns including the Southern Regional Research Laboratory of New Orleans. Mr. Dickson wrote for scientific journals and was the holder of a number of patents. He was a member of the M. I. T. Club of New York and several scientific and technical societies. For many years, he was a leader in the Appalachian Mountain Club. Surviving are his wife and son.

L. E. Warford

► L. E. Warford, founder, president and treasurer of Melflex Products Co., died on June 8 at the Good Samaritan Hospital in West Palm Beach, Fla. He was 66 years old. Born in Albany, Ore., Mr. Warford attended Willamette University and the University of Oregon. He entered the Army Air Corps in World War I, serving as a pilot at Rockwell Field, near San Diego, Calif. After the war, he joined the reserve and became a captain. For a time, he was associated with the B. F. Goodrich Co. as Pacific Coast advertising manager and later he went to Washington as a special agent in the Commerce Department. In 1929, he founded Melflex Products in Akron, heading the company until his death. Active in a number of groups, Mr. Warford worked for improved highways as a member of the Committee on Uniform Vehicle Laws of the National Highways Users Conference and he took part in safety work with a number of national groups. Mr. Warford was a member of many civic and social groups.

Irving W. Reynolds

► Irving W. Reynolds, vice-president of the Foxboro Co., Foxboro, Mass., died of a heart attack on June 3. One of the first to join the firm, Mr. Reynolds went to Foxboro from Waterbury, Conn. in 1909, the year the company was founded. He specialized in the production of precision instruments and, as factory manager, perfected techniques of manufacturing the process instrumentation developed by the organization. Following World War II, Mr. Reynolds devoted himself increasingly to his vice-presidential duties contributing his experience and counsel on manufacturing problems. Mr. Reynolds was a graduate of Highland Military Academy, Worcester, Mass. and Massachusetts Institute of Technology. He was a director of the First National Bank of Mansfield, Mass. and a member of several Foxboro social organizations. Mr. Reynolds is survived by his wife and son.

Raymond Bill

► Raymond Bill, president of the Bill Brothers Publishing Corp., New York, N. Y., publishers of *Rubber World*, died at his home in Greenwich, Conn. on June 13. He was 61 years old. Born in Old Lyme, Conn., Mr. Bill entered the publishing business in 1916, after he was graduated from the University of Wisconsin. He specialized in trade publications and was one of the organizers and the first president of National Sales Executives, Inc., now an organization with 28,000 members and 221 affiliated clubs. Mr. Bill was chairman of the Sales Promotion Executives Association, vice-chairman of National Business Publications, Inc. and a director of the Magazine Publishers Association. He also headed more than a dozen trade publications and allied organizations. Mr. Bill was a World War I Navy veteran. Surviving are his wife and two daughters.

Harry S. Rogers

► Dr. Harry Stanley Rogers, president of the Polytechnic Institute of Brooklyn, died on June 6 at Long Island College Hospital in Brooklyn, N. Y. He was 66 years old. Dr. Rogers suffered a cerebral hemorrhage on June 6, after appearing as guest of honor at a banquet sponsored by the staff of the Institute's undergraduate weekly newspaper. President of the school since 1933, Dr. Rogers had had an active career as instructor and administrator in technical fields. During World War II, he served briefly in the Office of Price Management and later as chief of the Rubber Branch of the War Production Board. The recipient of three honorary degrees, Dr. Rogers was also a member of many business, civic and social organizations. He is survived by his wife and son.

Introduces Safti-Flight Tire

► Fisk Tires Division of the U. S. Rubber Co., New York, N. Y., has introduced what is said to be the first passenger tire with permanent balance. A goal of tire manufacturers since 1934, accomplishment of precise balance in the new tire results in a vibration-less ride even at high speeds, the company says. Other advantages cited are easier steering, longer tread wear and a quieter ride.

The tire, called the "Safti-Flight," is balanced by a thin, wide strip of dense rubber running around the inside wall. The strip, or balance band, is vulcanized permanently to the lining of the tire when the tire is cured. This balance band is regarded as a basic advance in the design of tubeless tires, where no inner tube helps to hold the "dough" against the inside of the tire.

Manufactured only in tubeless construction, the new Fisk tire is made with nylon tire cord which is said to be twice as strong as the nylon cord normally used in tires. It is the only passenger tire with an 8-ply rating and is considered virtually blowout-proof, according to the company. The balance band also gives extra grip around an object in case of puncture in order to help prevent sudden air loss.

Featuring a new tread design, 92 per cent of the "footprint" area of the Safti-Flight comes in contact with the road. The new tread has five rows: a central rib, which provides steering and handling ease, flanked by two wide rows designed to give skid and traction, and two narrow outside rows to eliminate squealing on turns. A 1¾ inch white sidewall is protected by a double scuff guard.

Paul C. Baker

► Paul C. Baker, one of the founders and former vice-president and general superintendent of the Summit Mold & Machine Co. in Akron, Ohio, died of a heart attack on June 3. Mr. Baker was born in Gambier, Ohio and had been an Akron resident since 1906. A graduate of Ohio Northern University, Mr. Baker was once associated with the Wellman-Seaver-Morgan Co., Akron, Ohio.

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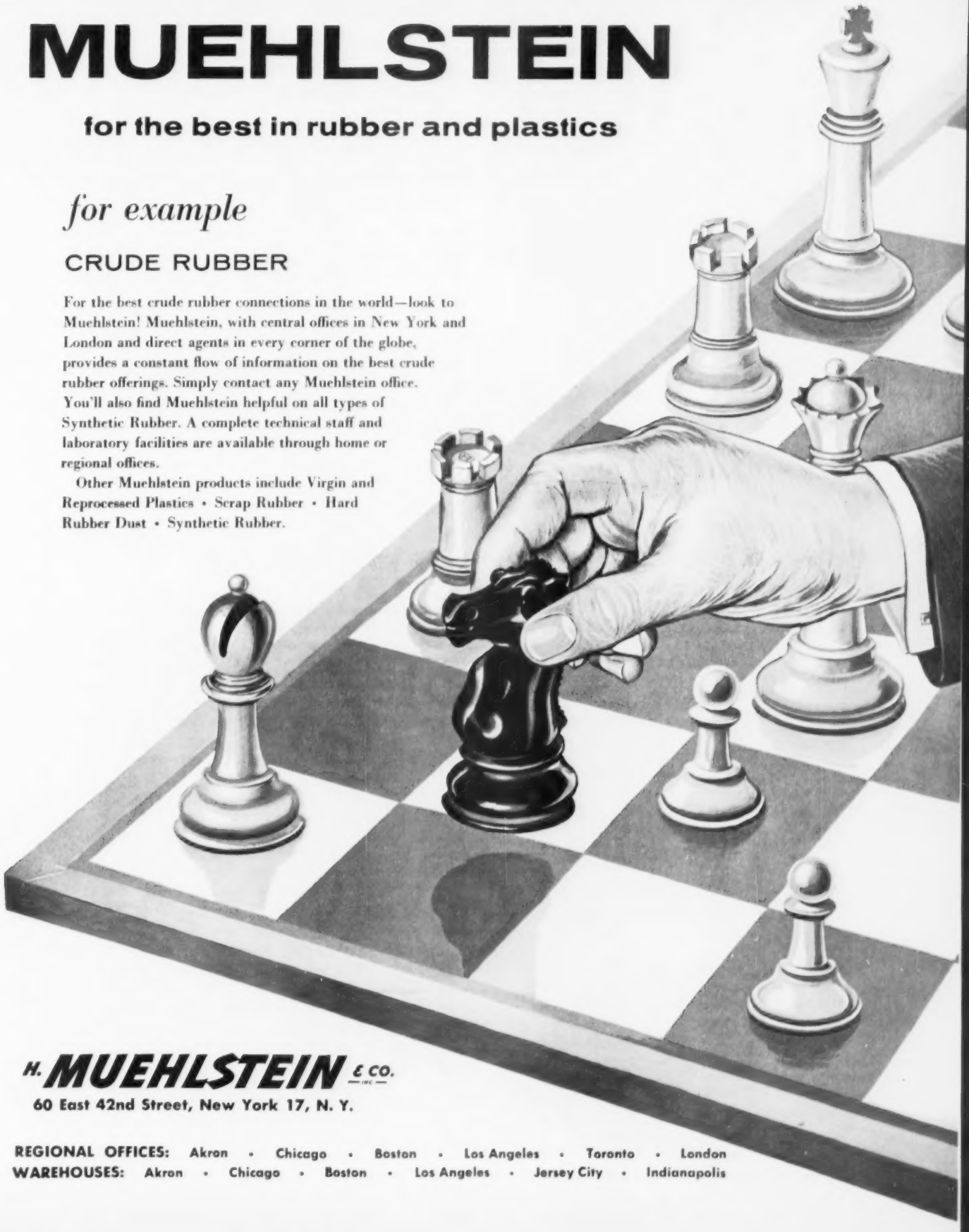

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Overseas

By Comtel-Reuter

Geneva—A decline in the volume of net imports of natural rubber by western Europe and North America is held likely by 1973-75, according to the Annual Report on International Trade for 1956 made by the General Agreement on Tariffs and Trade Organization. The report said future development was dominated by the contrast between the prospective high rate of increase in world consumption of rubber and the much lower rate of increase in world production of natural rubber.

—•—

Rio de Janeiro—Lack of supplies has forced Firestone to temporarily close its tire factory and has put all tire factories on part-time production schedules. The shortage was attributed to the refusal of Amazonian rubber producers to ship because of price and tax disputes and slowness of the Banco de Credito da Amazonia to import rubber.

—•—

Tokyo—Formation of a semi-official synthetic rubber manufacturing company is underway and should start production in 1959. To be organized under a special bill passed at the last session of the Diet, the company plans to negotiate for manufacturing techniques from Goodyear, Firestone and other United States manufacturers.

—•—

Kuala Lumpur—The Blackman Committee, a group of British experts appointed to inquire into the competitive position of natural rubber, has recommended that the Malayan Rubber Industry build up a reserve fund to help natural rubber compete with synthetic. The fund should be used for research, development and publicity. The report also warned that competition from synthetic would be intensified in the future. A leading rubber trader in London described this proposal as impractical.

—•—

Djakarta—Indonesia's Trade Minister, Professor Sunardjo, has denied reports that Indonesia has been negotiating with the United States for the delivery of 30,000 tons of Indonesian rubber. He said, however, his ministry was helping to facilitate purchases of rubber by private American firms who had made enquiries at the recent International Trade Fair in New York.

—•—

Colombo—The Ceylon Rubber Commission has announced another price cut of ten-Ceylon-cents per pound on all grades of sheet rubber. The revision follows the general decline in world market prices and the consequent revision of prices paid to Ceylon by Communist China under the long term agreement between the two countries.

—•—

Singapore—Chinese Rubber Traders have established their first direct connection with rubber traders and manufacturers in Europe. A spokesman for the Chinese dealers said this was an outcome of the recent Anglo-Malayan Rubber Conference in London.

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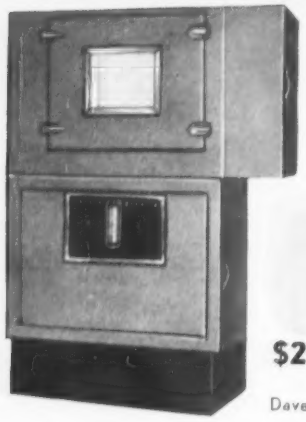

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OVERSEAS (CONT'D)

Italy—ANIC (Milan), a subsidiary of the state-owned Ente Nazionale Idrocarburi, will increase capacity of its synthetic plant currently under construction. The facility at Ravenna was originally designed to produce 35,000 metric tons a year of GR-S synthetic rubber. The GR-S capacity will be increased to 55,000 metric tons a year.

—•—

Singapore—T. E. Atkinson, deputy chairman of Lewis and Peat Singapore, Ltd., stated that the Rubber Brokers Association in Singapore broke down because it was unable to enforce rules regarding brokerage rates among its own members and was also unable to stop activities of numerous firms of "Five-Ton Brokers". Further existence of the Association, he said, would serve merely to penalize members who still loyally tried to abide by its rules.

—•—

London—Members of the Malayan delegation in London for talks on rubber have expressed satisfaction at the results achieved. The delegation discussed allegations of sub-standard rubber shipments from Singapore to the United Kingdom. Spokesmen of the group said they were given an insight into the requirements and operation of rubber manufacture in the United Kingdom.

—•—

Tokyo—The Japan Rubber Belt Industrial Association is negotiating with representatives from N. V. Handel Sonder Nening Franken & Co., a Dutch trading firm, for exports to the Soviet Union of 190 million plies of rubbert belt. According to the Association, the Dutch firm has concluded a contract with the Soviet Trading Corp. to export a large amount of rubber belt to the Soviet. The belts would be used on farming implements in Russia.

—•—

Djogdjakarta—A major proposal before the 13th meeting of the International Rubber Study Group is a French plan for stabilization of the price of rubber. A first step in this direction may be the formation of a committee to investigate the cause of price fluctuations.

—•—

Brussels—A new holding company has been formed to take over the entire assets of four rubber holding companies, Plantations Hallett, Huileries de Sumatra, Plantations de Johore and Plantations Tropicales.

—•—

Djakarta—Indonesia is to replant 2,277,500 acres of unproductive smallholders' rubber plantings over the next five years. This is a part of a 23 million rupiah plan to be spread over the next ten years. The Smallholders' Department has started preparing high grade rubber seedlings for planting on the 52,050 acres scheduled for replanting next year.

—•—

Kuala Lumpur—The president of the Malayan Planting Industries Employers' Association, said in a recent address that the Association would meet "as far as possible" requests from the National Union of Plantation Workers for a revised wage structure. He added that any new wage structure would be tied to hours of work in the case of field hands and productivity in the case of tappers.

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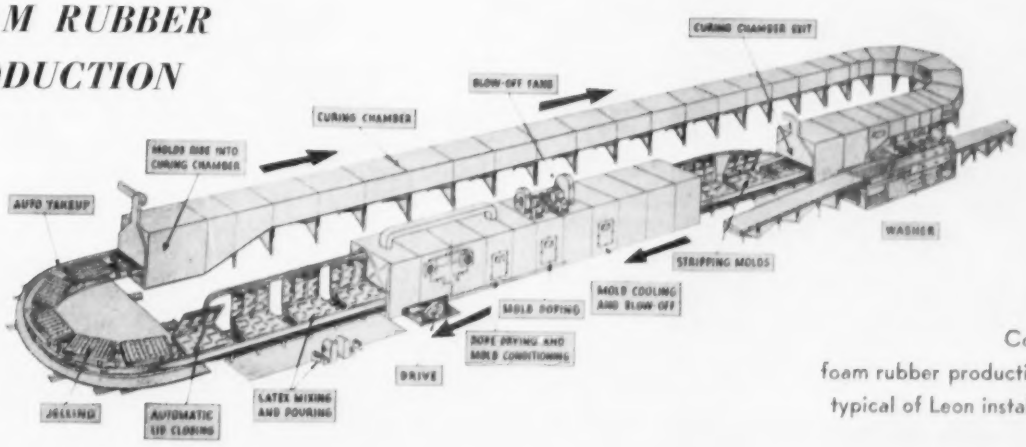

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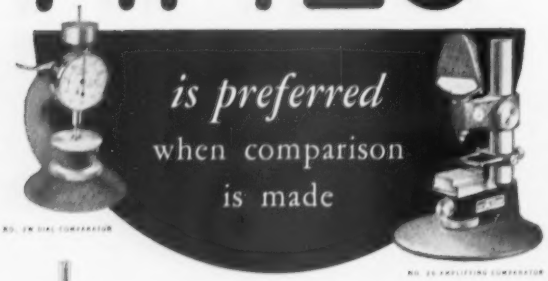

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New Goods

Nappy Chaise Pad

► Nappe-Smith Manufacturing Co., Farmingdale, N. J., has introduced a patented, new beach, lawn and chaise pad said to be so completely waterproofed that it can be left outdoors for months at a time. A combination of special waterproof quilted vinyl covering and electronically sealed seams keep out water and prevent mildewing for the life of the pad. The bottom side of

the pad is a special "non-skid" vinyl. "Nappy Chaise Pad" is filled with fiberglass containing air cells which prevent matting, the company says. There are also 140 "cooling channels" running across the vinyl covering to provide a ventilated, cool surface. The pad folds up compactly into four hermetically sealed and linked watertight sections and spreads out to a full 72 inches in over-all length. It is 25 inches wide and weighs 3½ pounds. It is available in striped white and turquoise blue, icy pink or lemon yellow.

Space-Saver Dors

► Wood Specialty Products, Inc., 24208 W. 60th St., Mountlake Terrace, Wash., has designed a new type space-saving door or room divider which utilizes full-length hinges extruded from Bakelite vinyl resins. The folding doors are said to have endured 250,000 test openings and closings without a sign of wear. Constructed of vertical kiln-dried wooden panels, 7/16" thick and either 3½ or 5½ inches wide, the "Space-Saver Dors" are available in Alaska cedar, Western red cedar or Philippine mahogany. The vinyl hinges have T-shaped edges that are anchored in slots in the edges of the panels. According to the company, the hinges are resistant to cracking and tearing during frequent stressing and over a wide range of temperatures, and to chemicals found in household cleaners and waxes as well as paints and lacquers.

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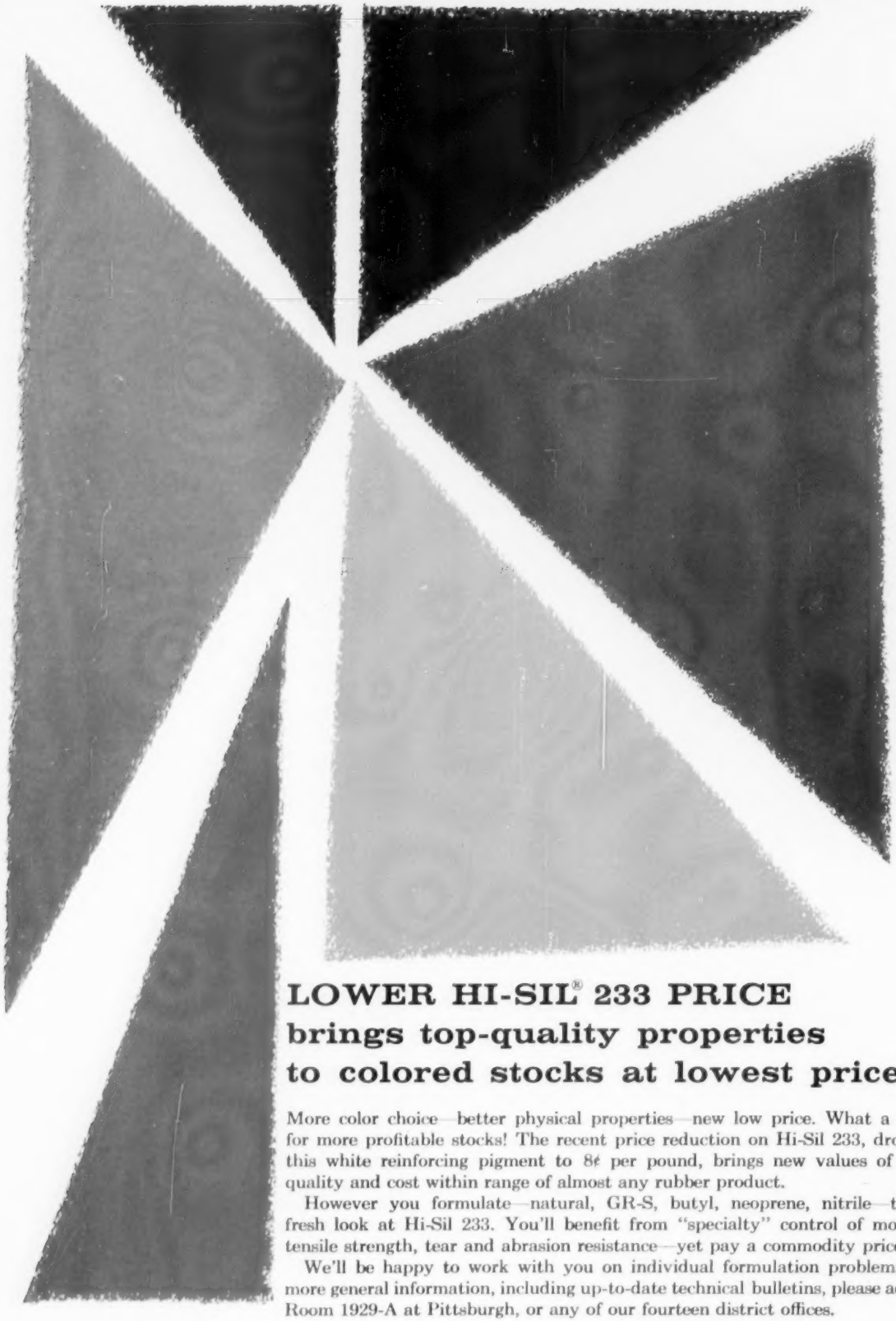

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High Altitude Suit

► B. F. Goodrich Aviation Products, a division of the B. F. Goodrich Co., Akron, Ohio, has announced the development of a full pressure high altitude suit of the type Naval aviators will use when entering the stratosphere. Developed under Navy contract, the suit has been tested by the U. S. Navy at the Naval Air Test Center, Patuxent River, Md. According to the company, tests demonstrate that Navy pilots wearing the suit will be

able to fly and fight in supersonic craft in the stratosphere as easily as they now fly in pressurized cabins in standard flying uniforms. Made of rubber and nylon, the suit is said to provide an artificial, pressurized atmosphere for the pilot. It contains its own communication, oxygen and ventilation systems and yet has more mobility, better visibility, comfort and protective features than previous models of high altitude protective equipment, the company claims. In development by Goodrich since 1951, it is sensitive to drops in aircraft cabin pressure, automatically pressurizing itself when such drops occur. Laboratory tests included an altitude chamber which simulated pressure at 80,000 feet for an 11-hour period.

Goodyear Tunneled Fuel Cell

► Goodyear Tire & Rubber Co., Akron, Ohio, is manufacturing a fuel cell at the Rockmart, Ga. plant, which is said to be uniquely "tunneled" to fit around the drive shaft of "Ontos", a new Marine Corps land combat vehicle. In order to achieve as low a silhouette as possible for the hit-and-run combat weapon, Goodyear's Aviation Products Division designed and built bladder cells that fit snugly into the free space around the vehicle's drive shaft. Fuel capacity of the rubber-bladder cell is 47 gallons. The cell is resistant to aromatic fuels. "Ontos", Greek word for "thing" is an 8½ ton track vehicle said to combine exceptional firepower with mobility. Marine Corps spokesmen claim Ontos has more firepower than any other land combat vehicle in history.

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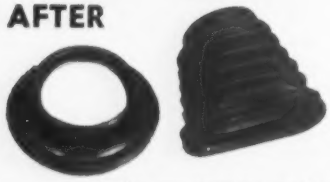

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► A new type of ball, molded of Bakelite polyethylene plastic, is now being manufactured by Cosom Industries Inc., 6012 Wayzata Blvd., Minneapolis, Minn. The ball has many advantages of a hard ball, but is so light in weight, it can be used indoors or in confined areas without smashing windows or causing lumps on youngsters' heads. Consisting of a hollow sphere with large perforations serving as windbreakers, the ball can

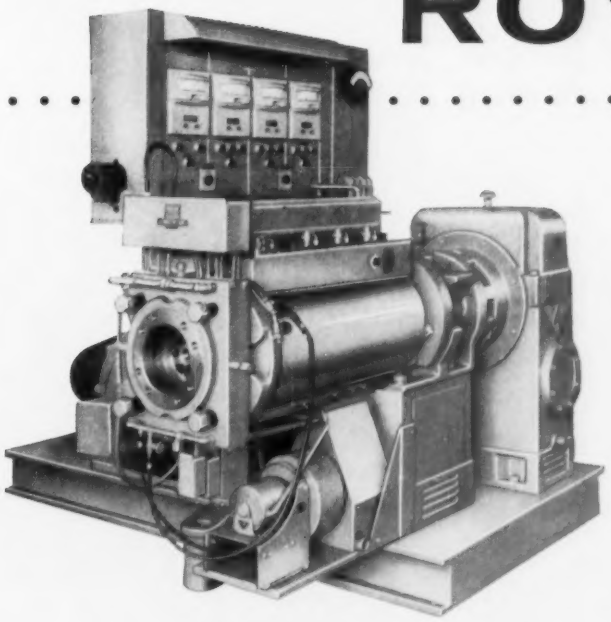
be used for playing catch, diamond ball, variations of volley ball, badminton, la crosse and many other games. It will float if it falls in the water. The new product measures 3½ inches in diameter and weighs only two ounces. Highly resistant to moisture and chemicals, the ball retains its strength and resilience even at temperatures below freezing and will not rot, mildew or otherwise decompose if left outdoors during bad weather. Mud can be washed off with soap and water to restore the white surface.

Open Center Tractor Tire

►A new open center tractor tire called "Firestone Open Center Spade Grip", said to permit rice farmers to start combining operations before irrigated fields have been dried by the sun, has been introduced by the Firestone Tire & Rubber Co., Akron, Ohio. Patterned in tread design after the company's open center tire which allows continuous in-operation cleaning, the Spade Grip is a deep tread tire capable of pulling heavy machinery through wet or sandy fields as well as over steep levies. Tread on the rear tire is twice as deep as on conventional open center tires. Made in 18-26 size, the half ton of rubber, rayon and steel is said to dig through mud and grip the firm undersurface in lowland and irrigated areas of the South's rice and cane belt. Heavy rubber shoulders and a wide cross section provide maximum flotation over sandy-loam fields. Tested for three years in the Memphis, New Orleans and Houston district, the tire proved to be capable of keeping machinery moving on soft ground. Reduced slippage results in a gas saving and increased draw bar pulling power.

ROYLE

SPIROD EXTRUDERS



These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

Write for Bulletin #463

JOHN ROYLE & SONS ROYLE PATERSON N. J. 1880

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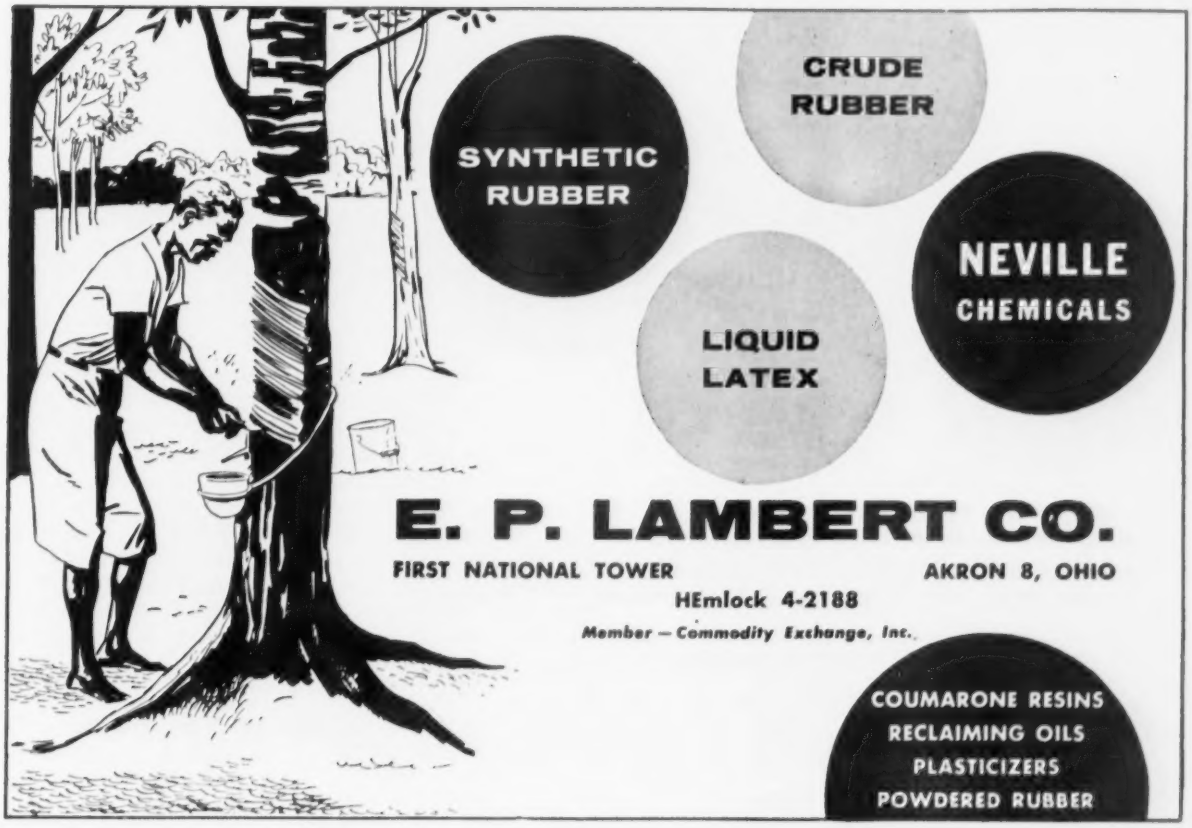

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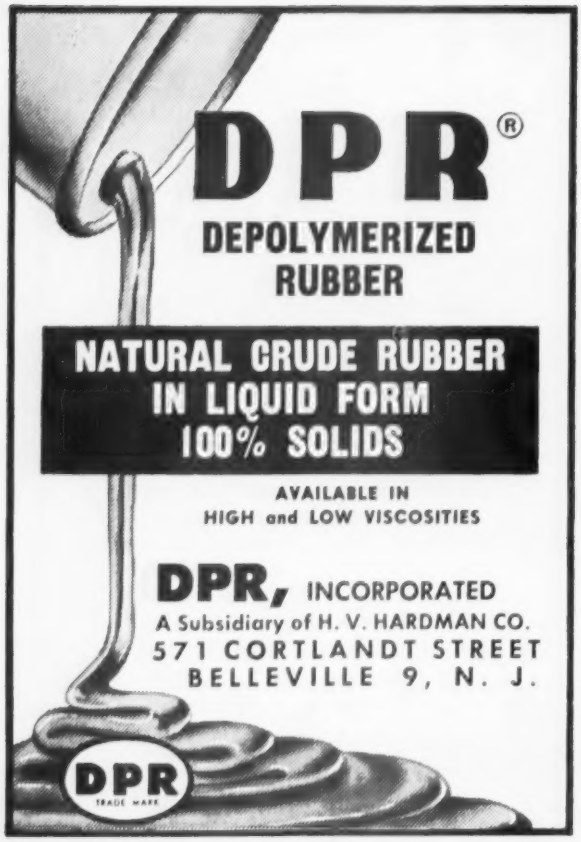
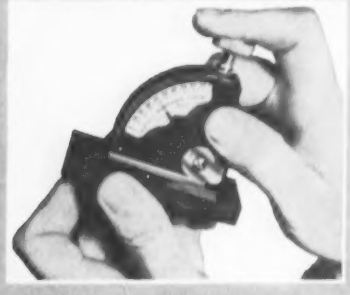


THE ORIGINAL...

Shore DUROMETER



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ROUND DIAL — MAXIMUM READING — for measuring cold flow or creep.

ROUND DIAL — CONSTANT LOAD — *(with dead weight attachment)* to eliminate variations in readings due to variable pressures in manual application.

The Shore Durometer is available in various models for testing the entire range of rubber hardness and is furnished complete with standard spring block and carrying case.

Write for FREE Descriptive Literature

Shore INSTRUMENT & MFG. CO., INC.
90-35D Van Wyck Expressway, Jamaica 35, N.Y.

Manufacturers of the "Scleroscope," for testing the hardness of metals.

New Equipment

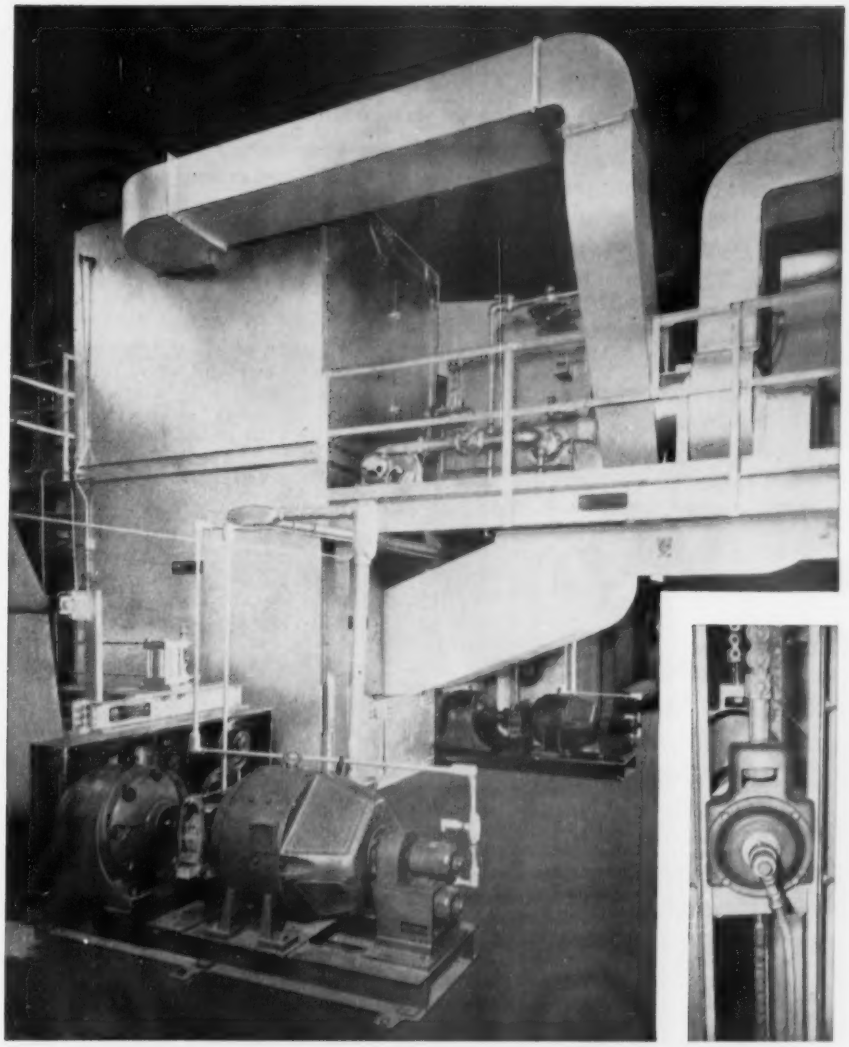
Goodman Rubber Slug Cutter

► The Model 4-24 rubber slug cutter manufactured by G. F. Goodman & Son, Richmond St. and East Columbia Ave., Philadelphia 25, Penna., for cutting extruded rubber is designed to cut samples 4 inches in diameter by up to 24 inches in length. One stock feed bushing and two cutting blades are furnished with the machine.

These have been set at the factory to deliver a clean cut. Blades, exposed by dropping the hinged guard on the side of the machine, are bolted to the cutter head spindle in a fixed position. One, two or four blades may be mounted on the cutter head as required. The feed tube bushing is mounted in a sleeve and locked in position by a set screw and nut. A lever is provided to raise feed rolls, permitting feed tube bushing to be removed.

The speed of the cutter head is controlled by a Reeves Varispeed unit mounted on the cutter motor. A handwheel is provided and the cutter head speed may be varied between 11 and 64 rpm. One blade will give from 11 to 64 cuts per minute; two blades, from 22 to 128 cuts per minute, and four blades, from 44 to 256 cuts per minute. The feed control wheel on top of the Reeves Motordrive will vary the feed between 4½ and 60 feet per minute. Feed roll bite is adjusted by means of a hand wheel located on the front of the machine. Knurled rolls are provided for flat stock, grooved rolls should be used for round stock.

► An improved **arc resistance tester** has been designed to evaluate the arc and track resistance of plastic materials by Delsen Corp., 719 West Broadway, Glendale 4, Calif.



Within the first day of startup, full width nylon tire cord processed in this 30-yard-per-minute, 14,000-pound-tension **IOI** Rollevator® Oven*, was made into aircraft tires meeting all qualification tests.

The Rollevator® roll automatically moves up and down within the oven, in direct relation to line speeds. Thus, at *any line speed, heat-exposure* time of the nylon is held *constant* at a constant temperature setting and at constant tension.

Rollevator® Oven* hot stretches nylon tire cord at constant optimum temperature, constant time and constant tension, at variable line speeds

The IOI Rollevator® Oven* is the answer to more uniform hot stretching of nylon with greater production efficiency. Simple and automatic in operation, it practically eliminates costly shutdown and repair time. When the line is stopped the Rollevator® roll automatically lowers out of the heat zone, eliminating the need for quick cool purging of the oven and the time and expense involved in reheating the oven when starting up again. Its low operating cost combined with low initial cost assures you of lower production cost. An IOI sales engineer will be glad to give you complete information about the Rollevator® Oven* and to discuss your requirements for any system from 3 to 100 yards per minute.

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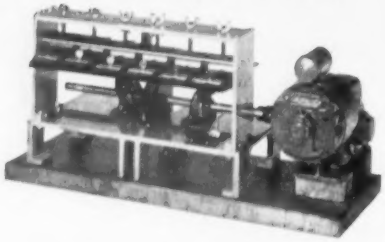
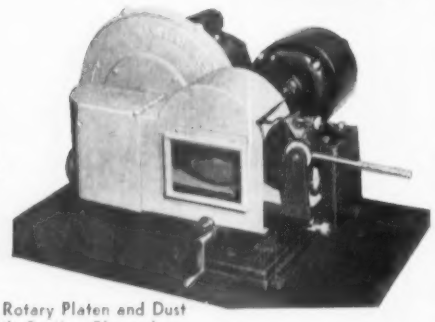
ROSS RUBBER FLEXING MACHINE
(for ASTM D1052)



RUBBER SAMPLE BUFFING MACHINE



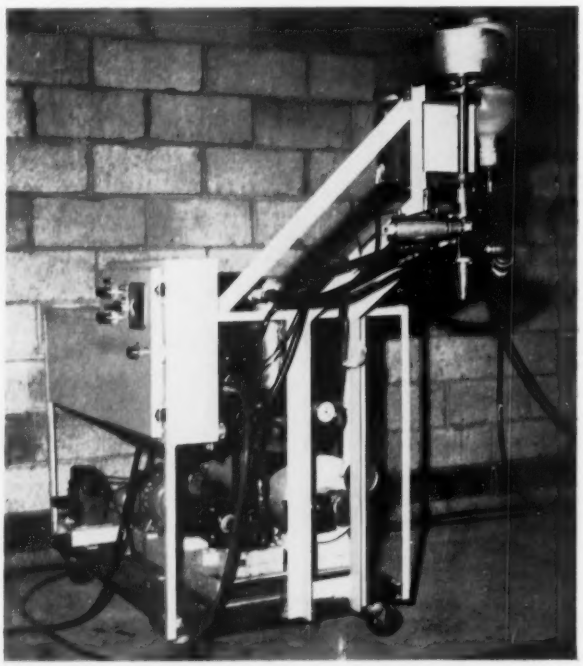
(Shown with Rotary Platen and Dust Collector with Suction Blower.)

EMERSON APPARATUS CO.

183 Tremont St., Melrose, Mass.

Urethane Foam Mixer and Dispenser

► The Nopcometer, a new machine that makes assembly-line production techniques possible in the industrial use of pour-in-place foam systems, eliminates a bottleneck for manufacturers, says the producer, Nopco Chemical Co., First and Essex Streets, Harrison, N. J. The optimum quantity of urethane foam one person



can hand-mix and pour is approximately two gallons, and if a single pouring calls for more than this quantity, several batches must be mixed and poured simultaneously or consecutively. The Nopcometer is claimed to perform these functions: (1) Automatically meter, mix and dispense Nopco Lockfoam components; (2) Deliver a predetermined charge of the formulation to the production line; (3) Deliver formulations of any density at any given rate from one to fifty pounds per minute, and (4) Give uniform results.

The Nopcometer is available in three different designs to handle the various pour-in-place systems. It is mounted on wheels for easy portability and, weighing 800 pounds, is relatively light. Operation can be made automatic and intermittent, and the mixing head may be located as much as 20 feet away from the metering pumps. The only facilities needed to operate the machine are an air supply and a 220-volt, 3-phase power source.

► A new, inexpensive indicating **pressure transmitter,** said to be accurate to ±½ per cent of scale range, is available from the Foxboro Co., Foxboro, Mass. The transmitter is used for pneumatic transmission of process pressure measurements.

Shore Constant Load Durometer

► The Shore Constant Load Durometer for testing the hardness of rubber and other elastomeric materials, manufactured by the Shore Instrument & Mfg. Co., Inc., 90-35 Van Wyck Expressway, Jamaica 35, N. Y., is designed to minimize the possibility of variations in

readings caused by differences in pressures of manual application of the instrument to the test specimen. A modification of the company's Type A-2 Durometer, it incorporates a 2 x 2 inch bottom plate and a dead weight attached to the top of the instrument. The combined mass of the dead weight and its holding screw is 822 grams, which is the maximum durometer mainspring pressure as defined in ASTM D-676. The durometer may also be used without the weight attached, either free-hand or mounted on an operating stand.

Taylor Pneumatic Controller

► Of special interest to the process industries is the new "Transcope" pneumatic controller, manufactured by Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y. It is said to provide an extremely accurate means of maintaining a given set point by relaying measured subsequent corrective action via a final control element such as a diaphragm valve or lever motor. It is ideal for the varying time constants of modern processing and for short span measurement. The controller, which measures 6 x 6 x 4½ inches, makes use of the motion-balance principle through interconnected multiple bellows and springs acting on a common force plate. Primarily for back-of-panel board application, its plug-in feature makes possible mounting to a separate manifold located either at the point of measurement or the point of control.

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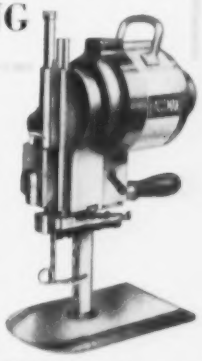

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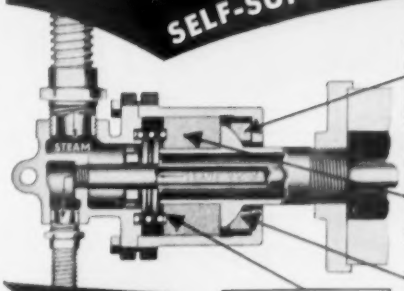

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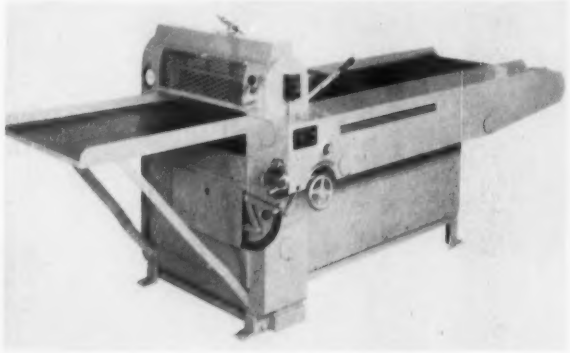
JUSTRITE Mfg. Co.
2061 N. Southport, Chicago, Ill.
CATALOG NUMBER 569-H-7

Heidrich-Nourse Stock-Cutter

► An automatic stock-cutting machine for soft plastics and rubber molding stock has been announced by Heidrich-Nourse Co., 631 East Third St., Los Angeles 13, Calif. Known as Model AH-2, the machine has an all-hydraulic actuation, features a guillotine-type knife and an automatic hitch feed. Length between cuts may



be set anywhere from 0 to 36 inches; once set, the machine will operate without any attention other than feeding, claims Heidrich-Nourse.

The machine is said to provide safe, accurate, automatic measurement and cutting of the sheet stock to 1½-inch thickness, without waste of material and without risk to the operator. It will handle stock to 24 inches in width and at speeds up to 100 cuts per minute. Another model has a 36-inch belt width.

► A low-priced **portable scale,** especially useful for weighing heavy bulk materials at storage bins located at scattered points within a plant, has been announced by Richardson Scale Co., Clifton, N. J. Capable of handling loads from 200 to 1,000 pounds, it is expected to save time in materials handling and simplify weight proportioning operations in plants where locations of bins present a problem.

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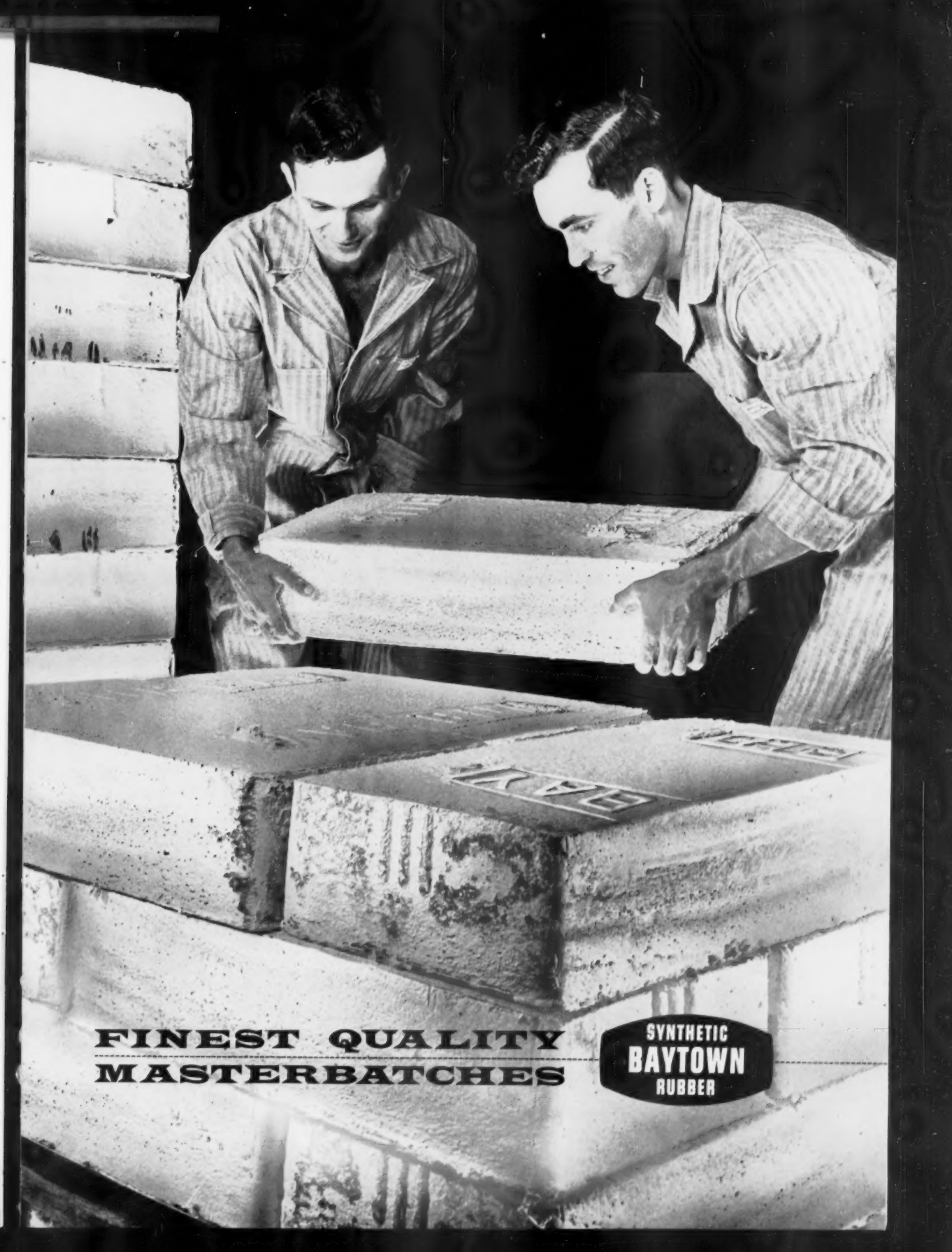
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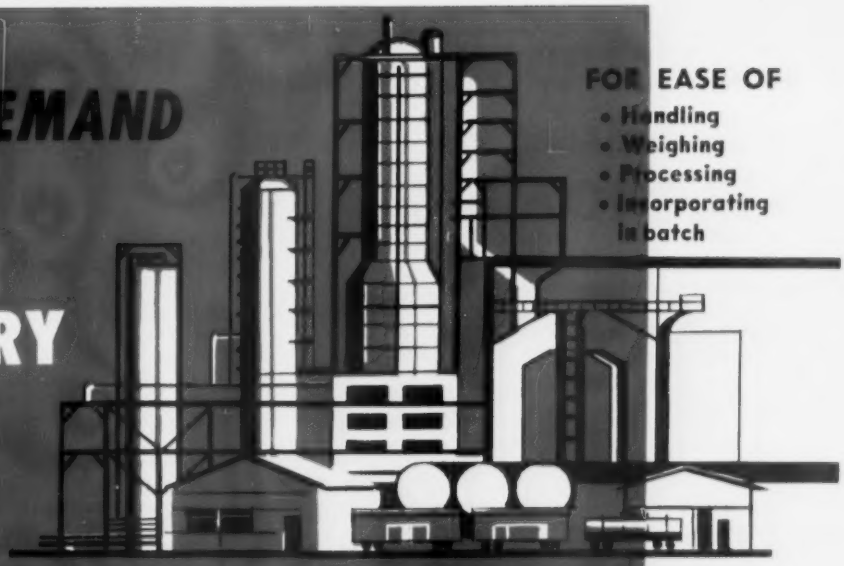

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Color	Amber	Composition	Modified Polystyrene
Specific Gravity	1.11	Odor	Characteristic
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Reviews

BOOKS

Textbook of Polymer Chemistry. By Fred W. Billmeyer, Jr. Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 6 x 9 in. 518 pp. $10.50.

This book is concerned with the chemistry, physics and technology of naturally occurring and synthetic polymers, including rubbers, plastics, and fibers. Written as a textbook, it includes no original work, but is an attempt to gather into one location and to classify some of the more interesting and important information about polymeric substances. It is based entirely on previously published information. The introduction to the volume offers information as to the structure and properties of polymers, followed by a history of the investigation and utilization of polymers. The parts which follow concern themselves with the physical chemistry of polymers, the kinetics of polymerization, the properties of plastics, the properties of fibers, the properties of elastomers, and various appendices.

The sections of the book which cover the elastomers touch upon such matters as the structure and properties of elastomers, vulcanization, reinforcement, natural rubber and related polymers, GR-S type rubbers, polyisobutylene and butyl rubber, and other synthetic rubbers. Valuable reference material is included in the book which also offers typical recipes and historical and statistical information. As the book was written for use with graduate-level courses in the chemistry of high polymers, the reader may have to supplement some of the information given by additional study of those works referred to in the text. Since no prior knowledge of high polymers on the part of the reader is assumed, much of the data presented are of an elementary nature. However, the very fact that so much detail has been gathered into this one volume makes it a recommended addition to the technical library.

•

Manufacturing Methods and Processes. By Arthur C. Ansley. Published by the Chilton Co., Chestnut and 56th Sts., Philadelphia 39, Penna. 6 x 9 in. 561 pp. $12.50

Designed to give a broad, general background on the latest developments in manufacturing methods and processes, this book describes briefly the methods and equipment used in each of the processes. Profusely illustrated, the book places its principal emphasis on the type of parts made by each process, chief applications and cost. Although it covers old standbys like sand casting, stamping, and machining, special attention is given to the new developments such as powder metallurgy, investment casting, plastics, ultrasonic machining, dielectric heating, electronic printed circuits, and automation. A chapter on assembly processes emphasizes the tremendous savings that can be made in this often neglected phase of manufacturing.

•

Handbook of Solvents. Volume 1: Pure Hydrocarbons. By Ibert Mellan. Published by the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y., 6 x 9 in. 249 pp. $6.50.

To be published in several volumes, this unique reference work presents concise information on the composition and properties of industrial solvents. This initial volume is devoted to pure hydrocarbons of all types—aliphatics, aromatics and terpenes. Commercial and proprietary names are used in lieu of chemical nomenclature; the hydrocarbon solvents are classified in accordance with their distillation range; and a wide spectrum of properties is given in tabular form for each solvent. This volume will be a valuable time-saver for all concerned with pure hydrocarbon solvents.

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CIRCO LIGHT. A general-purpose, naphthenic type softener.	Manufacture of nonstaining reclaims and butyl inner tubes. Processing regular neoprene and natural rubber.
SUNDEX 53. A moderately aromatic product compatible with natural rubber, regular neoprene, and butadiene-styrene polymers.	Manufacture of oil-extended polymers. Processing tire tread stocks, rubber footwear, matting, toys, semihard rubbers, etc. Extending high Mooney Neoprene type WHV with a maximum loading of 50 parts per 100 parts neoprene.
SUNDEX 1585. A predominantly aromatic product compatible with natural rubber and butadiene-styrene polymers. NEW	Particularly useful in the manufacture of oil-extended polymers where easy processing and optimum aromaticity are required.
SUNDEX 85. Highly aromatic product compatible with natural rubber, butadiene-styrene polymers, neoprene (regular and WHV), and acrylonitrile polymers. NEW	Manufacture of low cost neoprene articles. Particularly useful for extending neoprene with exceptionally high loadings—75 to 100 parts Sundex-85 to 100 parts neoprene type WHV.
SUNDEX 170. A relatively aromatic product with a high molecular weight.	Manufacture of mastic floor tile, battery cases, and resinous binders.
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SUN PROCESS AID 515. A nonstaining, highly paraffinic type petroleum derivative with a low viscosity and fair processing ability.	Manufacture of butyl inner tubes. Processing natural rubber and butadiene-styrene polymers where color stability in the finished vulcanizate is important.
SUN PROCESS AID 551. A nonstaining, highly paraffinic type product with a low volatility, medium viscosity, and fair processing ability. NEW	Manufacture of oil-extended polymers where nonstaining of the finished commercial article is important.
SUN PROCESS AID 594. A medium viscosity, naphthenic type petroleum derivative with a low volatility and good processing ability. NEW	Manufacture of oil-extended polymers. Dry mixing process for natural rubber and butadiene-styrene polymers. Economical where some discoloration in the finished rubber can be tolerated.

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French Rubber Institute
translated by
IRENE E. BERCK, Ph.D.
Editor, Chemical Publishing Co., Inc.

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BOOKLETS, CATALOGS, etc.

The Industrial Chemistry, Properties and Application of Silicones. By Charles E. Reed. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 48 pp. $1.50.

This booklet contains the Edgar Marburg Lecture which was presented before the fifty-ninth annual meeting of the American Society for Testing Materials in June, 1956. It begins with the definition and history of silicones, followed by sections on molecular structure, physical and chemical properties as related to engineering applications, silicone rubber, use of silicone rubber in wire and cable and in the protective coatings industry, and on other aspects of silicones and the silicone industry. An extensive use of photographs, charts, graphs and tables in the presentation of data, plus a long bibliography, add to the value of a publication helpful to anyone who uses basic information on silicones.

•

Rubber in Roads. Natural Rubber Bureau, 1631 K Street, N. W., Washington 6, D. C. (Reprinted from a booklet published by The Natural Rubber Development Board, Mark Lane, London, E. C. 3, England). 10¾ x 7¼ in. 28 pp.

This booklet delves into work by the English on rubber roads. Tests and statistical evidence are detailed to support each claim of superiority for rubber-asphalt surfacing. Less brittleness, improved impact resistance, greater toughness and extensibility, improved resistance to cracking and deformation, reduced temperature susceptibility at high and low ranges and long-wear endurance are covered by a wide variety of laboratory and field illustrations. Technical information sheets supplement the illustrations with tables and statistical data showing how rubber and asphalt are handled by the English highway engineer. The use of artwork and color enhances the effectiveness of the presentation.

•

Sharples Brand Merac in Latex Formulations. (Bulletin No. S-123). Industrial Division, Pennsalt Chemical Corp., 500 Fifth Ave., New York, N. Y. 8½ x 11 in. 12 pp.

The specific advantages of Merac, a liquid accelerator, in latex formulations are emphasized in this technical report. Data are included both on physical properties of the material and recommended procedures. Suggested compounds for natural latex and SBR 2000, neoprene and Hycar latices are given, with both original properties and properties after aging shown in each instance. Physicals covered include modulus, tensile and elongation. Films vulcanized with Merac are said to show very high physical values and excellent aging characteristics.

•

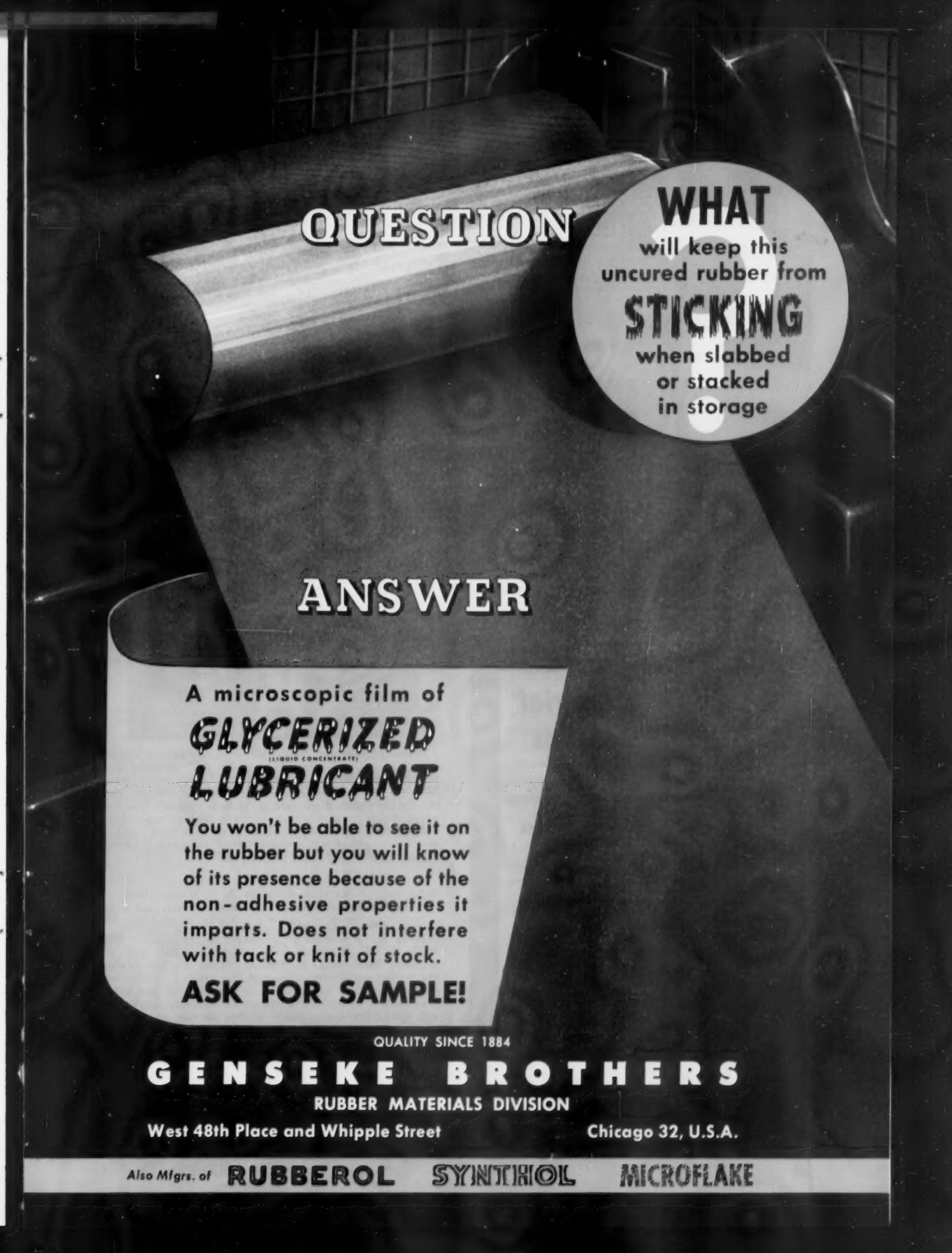
Protox Zinc Oxides in Rubber. The New Jersey Zinc Co., Inc., 160 Front St., New York 38, N. Y. 8½ x 11 in. 24 pp.

The properties of Protox zinc oxides are detailed in this well-designed two-color publication. The booklet is divided into three main sections, the first dealing with different varieties of the oxides, the second with non-pelleted oxides, and the third with pelleted oxides. Such subjects as handling and storage, processing characteristics (incorporation, dispersion, Banbury mixing, plasticizing effect, scorch resistance, calendering, extrusion and effects of variables), reinforcing characteristics and latex compounding are discussed. Graphs, charts, tables and photographs amplify the text.

•

DeVilbiss Spray Booths. (Catalog I-7000). DeVilbiss Co., Toledo 1, Ohio. 8½ x 11 in. 36 pp.

Spray booths of all types and sizes and for all applications are described in this attractive booklet. Included are specifications for custom design units as well as ready-made units. Photographs and schematic diagrams amplify the text.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BOOKLETS, CATALOGS, etc.

A Study of Butyl Solvent and Chemical Resistance. (Bulletin No. 102). Thiokol Chemical Corp., 780 No. Clinton Ave., Trenton, N. J. 8½ x 11 in. 12 pp.

This brochure gives a report on a study made to establish the resistance of butyl rubber to various solvents, chemicals and chemical solutions, such as aliphatic, aromatic and halogenated hydrocarbons, reference fuels, mineral oils, acids, esters, alcohols, ketones, ethers, corrosive solutions (inorganic salts, organic and inorganic acids and bases), and halogen gases. Testing procedures are described, and the results of the tests fully illustrated with graphs and charts. Tables illustrate solvent resistance, corrosion resistance at given concentrations and temperatures, and physical property changes after immersion for six days and two days. The booklet is a quick reference guide to the solvent and chemical resistance of butyl rubber.

•

Operations Research—A Basic Approach. (Special Report No. 13). American Management Association, 1515 Broadway, New York 36, N. Y. 6 x 9 in. 112 pp.

This report—and the orientation seminar at which the eight papers in it were presented—is a beginning effort by the American Management Association to present the fundamental concepts of operations research in basic business language. The new approach to management decision-making known as operations research is an extension of scientific and mathematical techniques into the solution of business problems. The subjects discussed include such topics as "Allocation of Resources," "Product Distribution and Multi-Plant Scheduling Through Operations Research" and "Operations Research in the Engineering Laboratory." This layman's presentation of a new trend in approaching the operating problems of business should interest anyone concerned with those problems.

•

Chemical Materials Introduced in 1956. Chemical Processing Magazine, 111 East Delaware Place, Chicago 11, Ill. 11¼ x 11¼ in. 16 pp. $1.00.

Reprinted from the April, 1957 issue of *Chemical Processing*, this prochure lists and describes 677 chemical compounds and products introduced by 136 chemical manufacturers during 1956. Of these products, 272 are completely new; the others were previously available, but from other manufacturers. A feature of the guide is a uses-index that categorizes all the products into 75 groups, such as adhesives, absorbents, antioxidants, plasticizers, resins, styrene-type rubbers and silicone rubbers.

•

Solux NS. (Report No. 57-5). By A. L. Moran. Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6¼ x 9½ in. 16 pp.

Solux NS, a new solid antioxidant, is described in detail in this booklet. Chemical and physical properties and compounding characteristics are listed. Tables are used to show the properties of various natural and synthetic rubber vulcanizates in which Solux NS has been used as the antioxidant. The booklet closes with a discussion of special applications and tests. A comprehensive briefing on the properties of the antioxidant is given.

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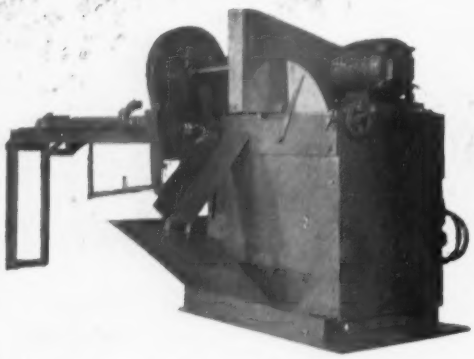

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BOOKLETS, CATALOGS, etc.

Accelerators for Rubber. (Technical Service Bulletin No. 9A/1). Monsanto Chemicals Limited, Monsanto House, 10-18 Victoria St., London S. W. 1, England. 8 x 10 in. 36 pp.

The bulletin provides details of the Monsanto accelerators for rubber and includes information of those introduced in the industry following the acceptance of synthetic rubbers, reinforcing furnace blacks and sulfurless cures. In addition, the properties of the accelerators found most valuable over the last 25 years are summarized. The table of contents lists thiazoles, sulfenamides, ureas, dithiocarbamates, thiurams, guanidines, aldehyde amines and special purpose accelerators. The composition, physical properties and compounding characteristics of each material are given. The booklet will be of value to anyone who might need brief notes on the use and application of the more common accelerators.

•

Polysar Introductory Bulletin. Polymer Corporation Limited, Sarnia, Ontario, Canada. 8½ x 11 in. 22 pp.

This booklet, as indicated by the title, is an introductory one from the manufacturer of Polysar rubbers and latices, all of which are described in terms of their properties and uses. Several general compounding suggestions for each are given, and a few typical formulae for some common applications are included. The rubbers are classified as general purpose, oil resistant, special purpose, butyl rubbers and latices. The attractive and clear presentation, which uses tables for simplicity, provides a brief but comprehensive introduction to the products of a company which produces over 100,000 tons of synthetic rubber annually.

•

Preliminary Evaluation of Zinc Oxide in Latex Paint. (Technical Paper No. 19). By Robert F. Schwartz. American Zinc Sales Co., P. O. Box 327, Columbus 16, Ohio. 8¼ x 11 in. 24 pp.

This brochure covers the preliminary results of an investigation involving the use of zinc oxide pigment in polyvinyl acetate latex paint. Over 40 latices of both homo and copolymer types were investigated for zinc oxide stability, and their chemical and physical properties, as given by the manufacturers, have been tabulated. A tentative specification for a polyvinyl acetate latex to have maximum stability with zinc oxide is given. This is the first of a series of brochures on the subject.

•

Breaking Lubrication Barriers. (Bulletin 110). Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn. 8½ x 11 in. 16 pp.

This brochure covers the history and development of the Molykote line of molybdenum disulfide lubricants. Providing extensive information on the technical aspects of molybdenum disulfide as an extreme pressure lubricant, the bulletin covers the physical and chemical properties of the compound and gives charts to demonstrate lubricity qualities. Featured in the book are a catalog-type selection table, four pages of photographs which show a variety of industrial uses, and a section on bonded solid film lubricating coatings.

•

Quick-As-Wink Air and Hydraulic Control Valves. (Bulletin No. 571). C. B. Hunt & Son, Inc., Salem, Ohio. 8½ x 11 in. 12 pp.

This attractive two-color bulletin illustrates Quick-As-Wink air and hydraulic control valves, including sliding sleeve, single plunger, O type, B type and high pressure hydraulic valves. The construction and operation of each valve is described, and the service for which each is best suited is detailed.

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (June 1), the price of spot rubber on the New York Commodity Exchange has moved in a range of 150 points, high for the period being 33.38c reached on June 11, 12 and 14, and low being 31.88c reached on June 4. The average price of spot rubber for the month of June was 32.80c based on 20 trading days. This compares with an average of 32.12c in the previous month.

As of late June, rubber futures prices have had a considerable setback from recent highs. The trade is of the opinion that this was due primarily to the announcement that Indonesia was negotiating to move more than 30,000 tons of rubber to the United States. At one point, futures lost as much as 2c from the top as markets abroad and in the U. S. were subjected to speculative liquidation.

Actuals Hold Steady

The actuals rubber price structure was generally maintained both here and abroad, but there was a great deal of uneasiness. The markets were firm for a time but reactionary tendencies were manifest due to a variety of reasons. The chief factors, however, were the liberal supplies coming from Indonesia. Singapore and Siam offerings have been extremely light but there is a great deal of concern over the possibility of these two countries competing with Indonesia.

Meanwhile, a committee headed by a Professor Blackman of Oxford University has warned that if natural rubber continues to sell at its present level, American consumers will rely more heavily on synthetic rubber. The committee advised Malayan producers that a price of 60c (Malayan) per pound is needed in contrast to the 92c (Malayan) per pound presently in effect.

Malayan rubber production in May declined some 3,500 tons from the previous month but was about 2,300 tons greater than the output in the corresponding month of the preceding year. During the first five months of 1957, Malayan production totaled 253,473 long tons compared with 252,186 tons in the first five months of 1956.

To Consider Supply and Demand

At the International Rubber Study Group meeting now getting underway in Indonesia, the current supply and demand position will be discussed and the trend of prices will be examined. The French delegation is putting forward a proposal for a price stabilization scheme which would involve, it is believed, the creation of a buffer stock and the fixing of floor and ceiling prices in relation to the price of synthetic rubber. A like plan was set aside a few years ago, largely because of American opposition, and it is believed that the Malayan delegation will oppose the new proposal.

At any rate, developments at the International Rubber Study Group will bear watching for it is at this meeting that there will be established a pattern for the natural rubber industry which will greatly influence the course of events for months and even years to come.

NEW YORK, JULY 1, 1957

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM JUNE 1 TO JUNE 30

June	Spot	July	Sept.	Nov.	Jan.	Sales
1	....	....	....	....	....	...
2	....	....	....	....	....	...
3	32.00	31.80	31.62	31.40	31.15	60
4	31.88	31.70	31.50	31.35	31.10	97
5	32.25	32.09	31.93	31.70	31.50	140
6	32.25	32.10	31.99	31.85	31.65	98
7	32.63	32.55	32.36	32.10	31.95	156
8	....	....	....	....	....	...
9	....	....	....	....	....	...
10	33.50	33.20	33.00	32.85	32.70	191
11	33.38	33.30	33.05	32.84	32.65	135
12	33.38	33.40	33.05	32.85	32.65	135
13	33.25	33.20	32.85	32.65	32.40	93
14	33.38	33.30	32.90	32.65	32.40	93
15	....	....	....	....	....	...
16	....	....	....	....	....	...
17	33.25	33.20	32.65	32.45	32.20	47
18	33.13	33.00	32.65	32.40	32.16	52
19	32.88	32.85	32.40	32.15	31.95	57
20	32.38	32.10	31.75	31.40	31.20	210
21	33.13	32.90	32.40	32.20	32.00	208
22	....	....	....	....	....	...
23	....	....	....	....	....	...
24	33.00	32.90	32.50	32.25	31.95	166
25	32.63	32.50	32.20	31.85	31.65	51
26	32.63	32.45	32.10	31.85	31.70	120
27	32.50	32.35	32.15	31.95	31.70	98
28	32.63	32.64	32.25	32.09	31.89	146
29	....	....	....	....	....	...
30	....	....	....	....	....	...

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.32 3/16
Aug.	.32 1/2
Sept.	.32 3/8
Thin Latex Crepe:	
Spot	.35 5/8
Thin Brown Crepe, No. 2	.29 7/8
Flat Bark Crepe	.21 5/8

London Market
(Standard Smoked Sheets)

Sept.	31.55 - 31.70
Oct.-Dec.	31.55 - 31.70

Singapore Market
(Standard Smoked Sheets)

Aug.	30.24 - 30.32

Middling Upland Quotations

	May 31	July 1		
	Close	High	Low	Close
July	32.50	35.51	35.47	35.50
Oct.	34.28	35.34	35.09	35.28
Dec.	34.24	35.24	34.98	35.19

Notes & Quotes

Raymond C. Firestone, president of the Firestone Tire & Rubber Co., stated upon his recent departure for Europe that the second half of 1957 had begun on a high level of business activity which could be expected to continue throughout the year. Mr. Firestone said that the outlook was particularly bright for the rubber industry. He noted that passenger car, truck and bus registrations in European countries outside the iron curtain have increased over 20 per cent during the last year. This is one of the best barometers of economic growth, he declared. It provides a challenge to rubber and automotive manufacturers to keep pace with the rising market. Mr. Firestone expects world consumption to reach 3,600,000 tons a year by 1960 and 4,400,000 tons by 1965.

Synthetic Rubber

H. C. Bugbee, president of the Natural Rubber Bureau, Washington, D. C., writing in a recent issue of the *Natural Rubber News* expressed the opinion that there will be a 77 per cent jump in world synthetic rubber production by 1960, while natural rubber output remains unchanged at its present level.

Mr. Bugbee stated that synthetic rubber production (excluding iron curtain countries), will climb from the 1,280,000 tons in 1956 to 1,570,000 long tons in 1957, 1,830,000 in 1958, 2,000,000 in 1959, and 2,245,000 in 1960. For natural rubber, he foresees a slight rise from the 1,880,000 tons produced in 1956 to 1,900,000 tons in 1957 with no further change through 1960.

Production-Consumption Ratio

His forecast includes the significant prediction that the growth of synthetic capacity will substantially outstrip consumption, while all natural produced will be consumed. Mr. Bugbee estimates that world consumption in 1957 will reach 3,100,000 long tons; 3,210,000 in 1958; 3,340,000 in 1959, and 3,500,000 in 1960.

Between 1957 and 1960, he said, natural rubber will supply 1,900,000 tons of this new rubber annually, leaving a synthetic demand of 1,200,000 tons this year, 1,310,000 in 1958, 1,440,000 in 1959, and 1,600,000 tons in 1960.

Mr. Bugbee's synthetic production forecast of an increase near 1,000,000 tons annually is dominated by probable growth in the United States. It includes, moreover, a tripling of capacity outside the United States. Of the 965,000 ton increase expected, he said, 710,000 will be added domestically. The balance will include an expansion of existing capacity in Canada and West Germany and new capacity in England, France, Italy, Japan and India.

Natural-Synthetic No Threat

Mr. Bugbee is also of the opinion that while the poly cis-isoprene rubbers do have a great many of natural rubber's desirable characteristics, they do not constitute a serious threat to natural's position at the 32c natural price level. The cost of producing these natural-like rubbers would be somewhat higher than 32c a pound, he believes.

The cost of building plants to handle a large volume of production would be excessive when weighed against the risk of having to compete against cheaper natural rubber.

The polybutadiene types, he stated, may prove cheaper to manufacture than the isoprene based rubbers. However, these types are, as yet, still some three or four years away from full development.

The NRB president also feels that if the natural premium over the GR-S type rubbers should decline from the present 9c to 2c or 3c for a period of from four to six months, natural could recapture at least a 40 per cent market position. The possibility exists, he believes, that under these conditions, natural rubber could even claim 43 to 45 per cent share of the total new rubber market.

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Butaprene NF	.4900 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1	.6400 [2]
Chemigum N3 and N5	.5800 [2]
Chemigum N6	.5000 [2]
Chemigum N7	.5000 [2]
Hycar 1001	.5800 [2]
Hycar 1002	.5000 [2]
Hycar 1014	.6000 [2]
Hycar 1041	.5800 [2]
Hycar 1042 and 1043	.5000 [2]
Hycar 1312	.5000 [2]
Hycar 1411	.6200 [2]
Hycar 1432	.5900 [2]
Hycar 1441	.6200 [2]
Paracril AJ	.4850 [2]
Paracril B	.5000 [2]
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Polysar Krynac 803	.5000 [3]

Butadiene-Styrene Types

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Ameripol 1002	.2435 [3]
Ameripol 1006	.2410 [3]
Ameripol 1007	.2425 [3]
Ameripol 1009	.2475 [3]
Ameripol 1500	.2410 [3]
Ameripol 1501	.2410 [3]
Ameripol 1502	.2410 [3]
Ameripol 1703	.2060 [3]
Ameripol 1705	.2035 [3]
Ameripol 1707	.1910 [3]
Ameripol 1708	.1910 [3]
Ameripol 1710	.1885 [3]
Ameripol 1712	.1885 [3]
ASRC 1000	.2410 [3]
ASRC 1001	.2410 [3]
ASRC 1004	.2410 [3]
ASRC 1006	.2410 [3]
ASRC 1009	.2475 [3]
ASRC 1018	.2700 [3]
ASRC 1019	.2650 [3]
ASRC 1500	.2410 [3]
ASRC 1502	.2410 [3]
ASRC 1503	.2625 [3]
ASRC 1703	.2060 [3]
ASRC 1708	.1910 [3]
ASCR 3110	.2600 [3]
Baytown 1600	.1760 [3]
Baytown 1601	.1760 [3]
Baytown 1602	.1760 [3]
Baytown 1801	.1600 [3]
Copo 1500	.2410 [3]
Copo 1502	.2410 [3]
Copo 1505	.2610 [3]
Copo 1712	.1885 [3]
FR-S 1000	.2410 [3]
FR-S 1001	.2410 [3]

Butadiene-Styrene (Cont'd)

FR-S 1004	.2410 [3]
FR-S 1006	.2410 [3]
FR-S 1009	.2475 [3]
FR-S 1010	.2600 [3]
FR-S 1012	.2425 [3]
FR-S 1013	.2500 [3]
FR-S 1014	.2810 [3]
FR-S 1015	.2910 [3]
FR-S 1500	.2410 [3]
FR-S 1502	.2410 [3]
FR-S 1703	.2060 [3]
FR-S 1705	.2035 [3]
FR-S 1712	.1885 [3]
Naugapol 1016	.2650 [3]
Naugapol 1018	.2700 [3]
Naugapol 1019	.2650 [3]
Naugapol 1021	.3000 [3]
Naugapol 1022	.2800 [3]
Naugapol 1023	.2850 [3]
Naugapol 1503	.2625 [3]
Naugapol 1504	.2950 [3]
Philprene 1000	.2410 [1]
Philprene 1001	.2410 [1]
Philprene 1006	.2410 [1]
Philprene 1009	.2475 [1]
Philprene 1010	.2600 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1100	.1940 [1]
Philprene 1104	.1900 [1]
Philprene 1500	.2410 [1]
Philprene 1502	.2410 [1]
Philprene 1503	.2625 [1]
Philprene 1600	.1930 [1]
Philprene 1601	.1930 [1]
Philprene 1605	.1900 [1]
Philprene 1703	.2060 [1]
Philprene 1706	.2030 [1]
Philprene 1708	.1910 [1]
Philprene 1712	.1880 [1]
Philprene 1803	.1740 [1]
Plioflex 1006	.2410 [3]
Plioflex 1500	.2410 [3]
Plioflex 1502	.2410 [3]
Plioflex 1703	.2060 [3]
Plioflex 1710	.1885 [3]
Plioflex 1712	.1885 [3]
Plioflex 1773	.2060 [3]
Plioflex 1778	.1910 [3]
Polysar Kryflex 200	.2410 [3]
Polysar Krylene	.2410 [3]
Polysar Krylene NS	.2410 [3]
Polysar Krynol 651	.1885 [3]
Polysar Krynol 652	.1910 [3]
Polysar S	.2410 [3]
Polysar S-50	.2410 [3]
Polysar S-X 371	.2550 [3]
Polysar SS 250	.3000 [3]
S-1000	.2300 [2]
S-1001	.2300 [2]
S-1002	.2325 [2]
S-1006	.2300 [2]
S-1011	.2325 [2]
S-1013	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1502	.2300 [2]
S-1600	.1825 [2]
S-1601	.1825 [2]
S-1602	.1825 [2]

Butadiene-Styrene (Cont'd)

S-1703	.1950 [2]
S-1706	.1925 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1801	.1675 [2]
Synpol 1000	.2410 [3]
Synpol 1001	.2410 [3]
Synpol 1002	.2435 [3]
Synpol 1006	.2410 [3]
Synpol 1007	.2410 [3]
Synpol 1009	.2475 [3]
Synpol 1012	.2425 [3]
Synpol 1013	.2500 [3]
Synpol 1061	.2410 [3]
Synpol 1500	.2410 [3]
Synpol 1502	.2410 [3]
Synpol 1551	.2410 [3]
Synpol 1703	.2060 [3]
Synpol 1707	.1910 [3]
Synpol 1708	.1910 [3]
Synpol 1711	.1900 [3]

Butyl Rubbers

Enjay Butyl 035	.2300 [3]
Enjay Butyl 150	.2300 [3]
Enjay Butyl 165 NS	.2400 [3]
Enjay Butyl 215	.2300 [3]
Enjay Butyl 217	.2300 [3]
Enjay Butyl 218	.2300 [3]
Enjay Butyl 268 NS	.2400 [3]
Enjay Butyl 325	.2300 [3]
Enjay Butyl 365 NS	.2400 [3]
Polysar Butyl 100	.2450 [3]
Polysar Butyl 101	.2775 [3]
Polysar Butyl 200	.2450 [3]
Polysar Butyl 300	.2450 [3]
Polysar Butyl 301	.2550 [3]
Polysar Butyl 400	.2450 [3]

Neoprene

	(prices f.o.b.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type WRT	.4500 [2]
Neoprene Type WX	.4100 [2]

Silicone Rubbers*

	(prices f.o.b.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	1.90 [3]
Silastic (gums)	3.85 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Polysulfide Rubbers

	(prices f.o.b.)
Thiokol Type A	.4700 [3]
Thiokol Type FA	.6400 [3]
Thiokol PR-1	.9500 [3]
Thiokol Type ST	1.00 [3]

(latices—all prices per pound dry weight)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [3]
Chemigum 235	.5400 [3]
Chemigum 236	.5400 [3]
Chemigum 245	.4600 [3]
Chemigum 246	.4600 [3]
Hycar 1512	.4600 [3]
Hycar 1551	.5400 [3]
Hycar 1552	.4600 [3]
Hycar 1561	.5400 [3]
Hycar 1562	.4600 [3]
Hycar 1571	.5400 [3]
Hycar 1572	.5100 [3]
Hycar 1577	.4600 [3]
Hycar 1852	.4400 [3]

Butadiene-Styrene Types

Copo 2101	.3000 [3]
Copo 2102	.3200 [3]

Butadiene-Styrene (Cont'd)

Copo 2105	.3200 [3]
Copo X-765	.3000 [3]
FR-S 2000	.2600 [3]
FR-S 2001	.2600 [3]
FR-S 2002	.2850 [3]
FR-S 2003	.2950 [3]
FR-S 2004	.2950 [3]
FR-S 2006	.2600 [3]
FR-S 2105	.3100 [3]
Pliolite 2101	.3000 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite X-765	.3000 [3]
Naugatex 2000	.2630 [3]
Naugatex 2001	.2630 [3]
Naugatex 2002	.2880 [3]
Naugatex 2006	.2630 [3]
Naugatex 2105	.3120 [3]
Naugatex X-765	.2900 [3]
Naugatex X-767	.3120 [3]

Butadiene-Styrene (Cont'd)

S-2000	.2275 [3]
S-2006	.2150 [3]
S-2101	.2250 [3]
S-2105	.3100 [3]

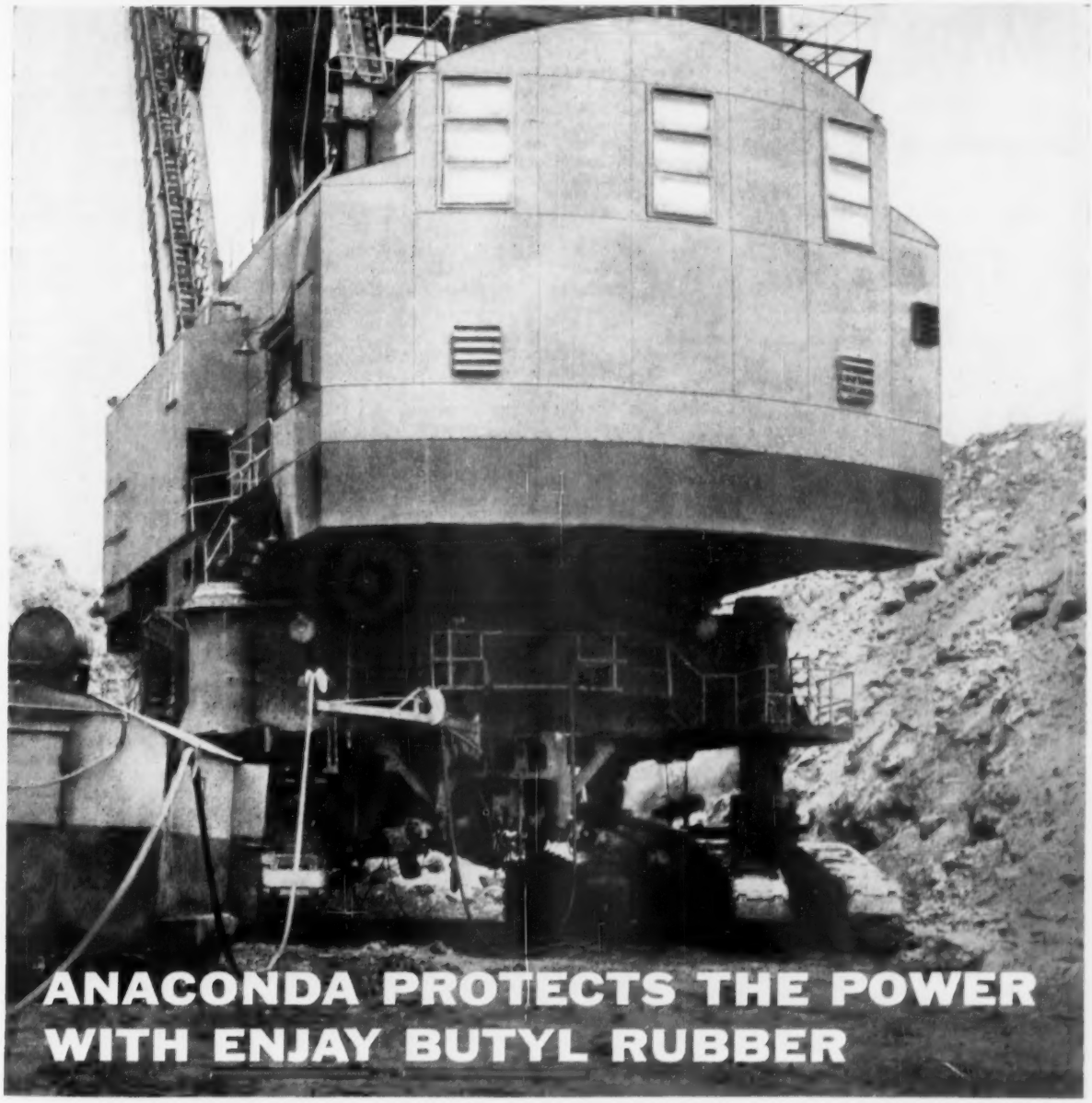
Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.7000 [3]
Thiokol Type WD-2	.9200 [3]
Thiokol Type WD-6	.7000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.



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MARKETS

(continued)

Reclaimed Rubber

The Department of Commerce reports that in the first four months of the current year, 94,826 long tons of reclaimed rubber were produced in the United States, compared with the 108,629 long tons produced in the comparable period of the preceding year. As for consumption, a total of 94,406 long tons were consumed in the U. S. in the first four months of 1957 against the 101,387 long tons consumed in the first four months of 1956. As of April 30, 1957, there were 30,029 long tons of reclaimed rubber in stocks, while on April 30, 1956, there were 34,360 long tons in stocks.

The statistics available to date indicate that both production and consumption so far in 1957 are running at just about the previous year's pace. At the current rate, 1957 will see a total reclaim production of about 285,000 long tons, against the actual 286,804 long tons in the previous year. Reclaim consumption, on the other hand, is running slightly ahead of 1956.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Scrap rubber exports showed an increase in March over February's shipments, according to statistics released recently by the Bureau of the Census, U. S. Department of Commerce. March exports totaled 4,466,095 pounds valued at $234,001, compared with 3,629,339 pounds worth $143,694 in February of this year. For the first quarter of this year, exports totaled 11,930,708 pounds.

Scrap rubber imports for February, based upon latest available Census Bureau statistics, totaled 1,311,114 pounds valued at $50,993, compared with 1,373,750 pounds worth $54,909 in the previous month.

According to reports from abroad, scrap rubber exports from England have been declining. Spain is presently the best customer for British scrap, with Japan next in importance. Other customers include West Germany, France, the Netherlands and the U. S.

(Prices Delivered Akron)

Mixed tires	ton	16.00
Light colored carcass	lb.	.05½
No. 1 peelings	ton	45.00
No. 2 peelings	ton	30.00
No. 3 peelings	ton	20.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	19.00
Passenger S.A.G.	ton	17.50
Natural Rubber Red Tubes	lb.	.07¾
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.04¾

Tire Fabrics

The pickup in demand for wide industrial fabrics, which began a few weeks ago, is apparently continuing, with vinyl plastic coaters seeking rush or immediate delivery before mill and finishing plant vacations begin. Most mills producing wide industrial fabrics as well as most finishing plants close for vacations at about this time of year.

The needs of automobile manufacturers are said to have created this market upsurge. While the buying has not been big enough to cause any reversal in the soft price tone, it has created a more buoyant undertone.

A considerable amount of uncertainty has existed in the market during the past few weeks on the question of prices for various constructions. This lack of confidence has developed in part because of reports of price cutting and concessions on various fabrics.

It is difficult to estimate whether the current flurry of buying will serve to stablize wide goods prices in some measure. If additional forward buying develops within the next few weeks, a firmer price tone is quite likely to develop.

New Rayflex Yarn

A new continuous filament rayon fiber with increased strength characteristics has been announced by the American Viscose Corp. The new "Super Rayflex" type yarn is available in 600 and 900 deniers. The new yarn is described as 40 per cent stronger than regular Rayflex, with 4.5 grams per denier conditioned strength compared to 3.2 grams per denier. It is made primarily for industrial uses, particularly reinforcing applications with laminates involving rubber, plastics, paper, etc.

The new yarn carries a 7c premium over regular Rayflex. However, the company maintains that Super Rayflex fabrics would be cheaper in the long run because the tensile strength of the yarn results in a saving where cost per pound of breaking strength is involved.

Cotton Yarn Trading Slow

Trading in cotton industrial yarns, including both carded and combed types, is very slow at this writing. Prices, however, are generally steady. This trading lag is due, in part, to pre-holiday inactivity. On the other hand, buying by the chief users has been on a restricted basis since the start of the year.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.73
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.95
840	lb.	1.80

Rayon Graded Fabric

100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.68
9.25 oz. (per square yard)	lb.	.66
11.65 oz. (per square yard)	lb.	.62
14.4 oz. (per square yard)	lb.	.71

Liquid Latex

Natural: Reports from the U. S. Department of Commerce indicate that 8,812 long tons of natural rubber latex were imported into the United States in April of this year making a four-month total of 16,658 long tons. The Commerce Department statistics indicate that 6,455 long tons of Hevea latex were consumed in April, for a four-month consumption total of 26,928 long tons. As of April 30, 1957, there were 12,032 long tons of natural rubber latex on hand, compared with the 21,384 long tons on hand as of Aprii 30, 1956.

Predicated upon the figures available so far, total consumption of natural rubber latex in 1957 should approximate 80,000 long tons, or about 7,000 long tons more than in the previous year. Imports, however, may fall off by 10-15,000 long tons. If, however, stocks are brought up to previous levels, imports in the latter part of the year may bring total imports for the year to just about 1956 levels.

Natural rubber latex is currently selling at about 40c per pound in car load quantities at East Coast ports. At these price levels there may very well be some drop-off in consumption, many in the trade believe. It is generally assumed that the 40c level represents a line over which some consumers do not care to cross.

Synthetic: In the first four months of the current year, 27,242 long tons of S-type latex were produced and 24,074 long tons consumed. In both cases, the figures were slightly ahead of production-consumption in the comparable period of the preceding year. Neoprene latex production-consumption is running at about the same level as in the previous year, while N-type latex production is running ahead of last year with consumption in the first four months of 1957 less than in the first four months of 1956. N-type latex stocks, however, are about half what they were at this point in 1956.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the extremely narrow range of 15 points since our last report (June 1), high for the period being 35.55c reached on June 28, and low being 35.40c reached on June 21 and 24. The average price of middling uplands for the month of June was 35.45c compared with 35.40c in the previous month.

The 1957 cotton acreage, on the basis of latest reports, is somewhat smaller than indicated this Spring, substantially smaller than last year, and apparently the smallest in *80 years*. Current reports place the area in cultivation at the end of June at only 13,585,000 acres. This is 19.3 per cent less than the 16,833,000 acres in cultivation on July 1, 1956.

Growers could have planted approximately 14,650,000 acres this year, representing the difference between the national acreage allotment and soil bank withdrawals of slightly over 3,000,000 acres. However, excessive rains and wet fields prevented farmers from attaining permissible plantings. The 1957 crop is off to a late start. Fields were flooded again and many farmers were reported to have given up the idea of planting this year altogether. Conceivably, early frosts could also cut production sharply this year.

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1956:				
Mar.	52,749	50,040	505	108,974
Apr.	51,394	47,446	731	109,822
May	39,789	48,342	753	107,324
June	36,694	42,845	865	101,748
July	41,195	38,353	712	103,301
Aug.	40,367	46,091	759	97,967
Sept.	42,974	44,179	1,184	98,069
Oct.	52,638	52,188	1,543	94,508
Nov.	49,757	42,946	707	106,316
Dec.	57,653	45,227	912	115,949
1957:				
Jan.	46,349	52,631	691	101,758
Feb.	37,487	46,427	693	100,253
Mar.	40,680	48,263	1,218	97,820

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1956:					
Mar.	44,947	35,238,125	7,791	7,507,686	52,738
Apr.	44,443	31,826,631	6,996	6,369,348	51,439
May	34,058	22,579,829	5,731	4,782,907	39,789
June	31,687	19,375,943	5,006	3,732,281	36,693
July	37,673	22,164,793	3,522	2,539,365	41,195
Aug.	35,652	19,703,676	4,715	3,277,700	40,367
Sept.	40,184	23,453,972	2,790	2,207,011	42,974
Oct.	40,690	28,494,068	5,738	4,341,172	46,428
Nov.	44,995	26,693,282	4,761	3,698,504	49,756
Dec.	50,992	31,077,000	6,661	5,170,306	57,653
1957:					
Jan.	39,889	24,412,461	6,461	5,203,207	46,350
Feb.	33,145	21,603,218	4,342	3,491,212	37,487
Mar.	34,824	22,769,949	7,336	5,193,356	42,160

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America	Rest of World*	Total*
1945	8,600*	10,000*	97,500	12,000*	47,125	73,570	250,000
1946	403,719	175,000*	94,000	19,975	39,678*	105,080	837,500
1947	646,362	277,951	89,000	38,128	34,928*	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158*	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318*	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902*	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777*	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475*	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318*	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833*	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000*	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,817,000
1956:							
Oct.	52,991	56,052	7,885	10,191	2,280	38,101	167,500
Nov.	49,688	66,236	9,717	11,894	2,501	29,964	170,000
Dec.	58,850	72,502	11,440	12,546	500*	31,662	187,500
1957:							
Jan.	63,449	46,437	8,793	.....	500*	35,821	155,000
Feb.	49,115	37,035	4,565	.....	500*	33,785	125,000
Mar.	47,740	65,740	5,733	.....	500*	45,998	165,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1944	710,783	86,977	34,310	132,500	160,690	1,125,000
1945	799,009	91,047	41,836	87,500	108,164	1,127,500
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	345,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1956:						
Sept.	113,171	17,665	7,645	60,250	48,769	247,500
Oct.	133,948	22,887	8,603	68,250	36,812	272,500
Nov.	114,256	19,504	8,598	70,750	44,392	257,500
Dec.	117,390	17,867	7,452	62,250	50,041	255,000
1957:						
Jan.	138,121	18,104	8,242	64,750	35,783	265,000
Feb.	123,687	18,378	7,995	60,750	41,690	252,500

Source: International Rubber Study Group. * Estimated.

Rim Production

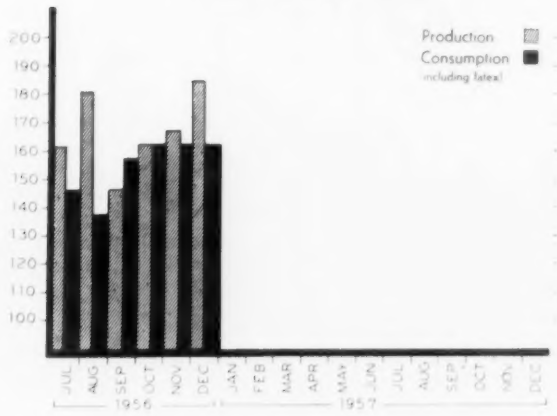
	1952	1953	1954	1955	1956
Passenger Car	24,936,844	31,318,461	25,952,322	38,092,080	27,109,610
Truck & Bus	5,752,674	5,228,321	4,463,689	6,642,329	6,315,428
Agricultural	2,073,116	1,943,487	1,297,040	1,931,768	1,416,938
Earth Mover	31,791	24,685	21,536	38,859	88,812
Total	32,794,425	38,514,954	31,736,587	46,705,036	34,930,788

	1956 Dec.	1957 Jan.	Feb.	Mar.	Apr.	May
Passenger Car	2,633,768	2,797,268	2,640,338	2,644,185	2,665,142	2,411,221
Truck & Bus	408,167	468,265	449,967	475,872	569,917	482,508
Agricultural	64,640	157,773	133,593	162,928	151,134	117,837
Earth Mover	8,252	6,857	6,700	14,153	8,040	6,231
Total	3,114,827	3,430,163	3,230,598	3,297,138	3,394,233	3,020,436

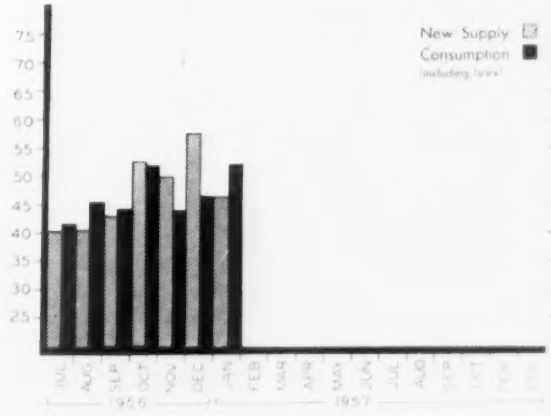
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

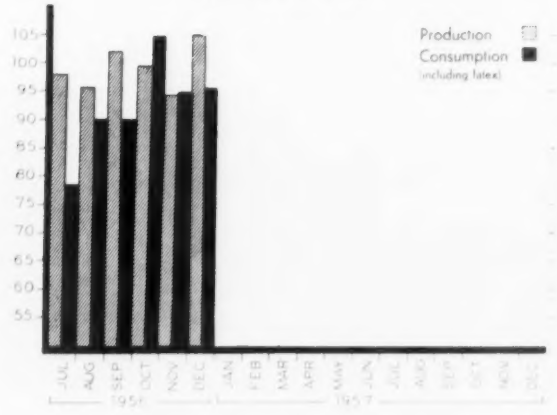
NATURAL RUBBER—WORLD
(thousands of long tons)



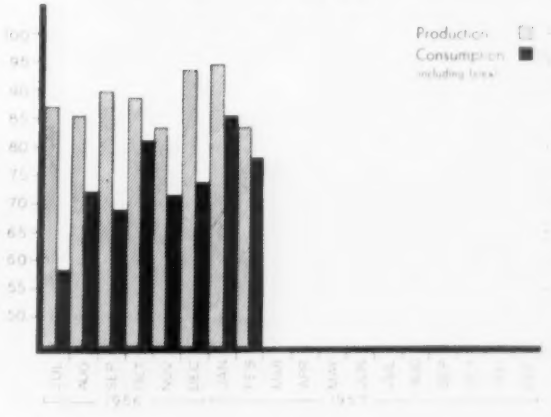
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



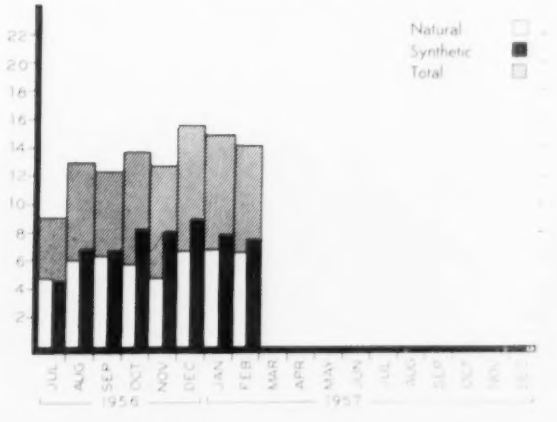
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



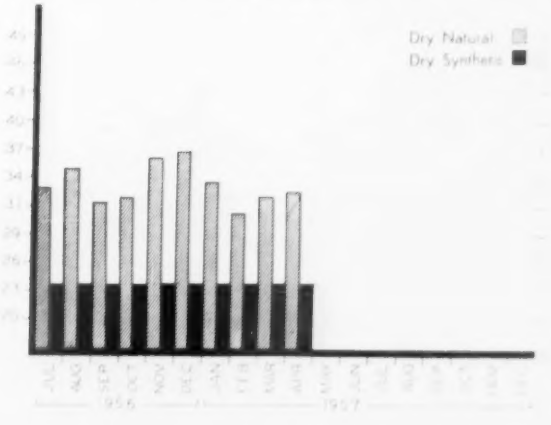
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
cents per pound



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	**310,529**	**35,215**	**54,046**	**11,072**	**410,862**
1950	**378,887**	**50,067**	**60,915**	**12,037**	**501,906**
1951	**704,529**	**58,907**	**76,475**	**15,333**	**855,244**
1952	**654,854**	**65,745**	**81,630**	**16,228**	**818,447**
1953	**680,728**	**80,495**	**79,801**	**20,198**	**861,222**
1954	**490,405**	**69,150**	**58,802**	**21,396**	**639,753**
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1956:					
June	69,820	8,929	4,638	2,350	85,737
July	70,831	7,935	7,192	2,460	88,418
Aug.	70,122	7,769	7,118	2,125	87,134
Sept.	73,321	8,328	7,252	2,322	91,223
Oct.	70,690	8,144	7,018	2,973	88,825
Nov.	66,482	8,614	6,065	3,092	84,253
Dec.	76,056	8,828	6,447	2,881	94,212
1957:					
Jan.	76,224	9,432	6,366	2,957	94,999
Feb.	66,023	9,004	5,664	2,963	83,654
Mar.	76,546	8,031	6,460	3,320	94,357
Apr.	65,147	8,902	5,883	2,408	82,340

Consumption

1950	**416,230**	**43,781**	**66,348**	**11,930**	**538,289**
1951	**626,444**	**48,887**	**70,500**	**13,066**	**758,897**
1952	**666,420**	**55,522**	**71,229**	**13,866**	**807,037**
1953	**624,181**	**65,900**	**77,826**	**16,929**	**784,836**
1954	**500,345**	**57,203**	**61,464**	**17,715**	**636,727**
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1956:					
June	56,390	5,536	4,026	1,864	67,816
July	48,907	4,435	3,316	1,538	58,196
Aug.	59,756	6,554	4,102	2,125	72,537
Sept.	57,135	6,057	4,044	1,969	69,205
Oct.	67,399	7,478	4,780	2,366	82,023
Nov.	58,692	6,676	4,093	2,065	71,526
Dec.	61,503	5,991	3,848	1,936	73,278
1957:					
Jan.	70,978	7,237	5,028	2,247	85,490
Feb.	64,322	6,235	4,581	2,122	77,260
Mar.	67,853	6,559	4,998	2,240	81,650
Apr.	63,131	6,246	4,648	2,096	76,121

Exports

1949	1,401	3,330	178	1,574	6,483
1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1956:					
July	9,038	1,994	523	433	11,988
Aug.	9,607	2,268	654	274	12,803
Sept.	8,804	2,824	439	403	12,470
Oct.	6,795	1,013	454	618	8,880
Nov.	4,789	1,056	247	551	6,643
Dec.	15,268	1,829	1,316	860	19,273
1957:					
Jan.	13,989	2,500	207	540	17,236
Feb.	13,353	2,505	439	482	16,779
Mar.	13,664	2,466	1,014	781	17,925

Stocks

1949	**77,731**	**4,654**	**12,224**	**3,433**	**98,042**
1950	**36,942**	**5,733**	**7,243**	**2,840**	**52,758**
1951	**105,271**	**8,379**	**12,481**	**3,821**	**129,912**
1952	**83,861**	**8,535**	**22,716**	**3,875**	**118,987**
1953	**135,153**	**11,480**	**24,866**	**4,346**	**175,845**
1954	**115,499**	**11,349**	**19,267**	**4,280**	**150,395**
1955	108,989	12,220	10,500	6,030	137,739
1956	151,763	14,077	28,744	7,934	202,518
1956:					
June	133,570	12,927	15,744	2,086	164,327
July	145,601	15,084	18,899	2,009	181,593
Aug.	148,176	14,540	21,267	8,503	192,486
Sept.	154,841	14,055	23,862	8,035	200,793
Oct.	151,646	12,841	25,734	7,567	197,788
Nov.	151,143	13,459	26,998	7,734	199,334
Dec.	151,763	14,077	28,744	7,934	202,518
1957:					
Jan.	143,177	13,073	29,810	7,664	193,724
Feb.	134,587	12,705	29,951	7,565	184,808
Mar.	131,255	11,949	30,814	7,795	181,813
Apr.	123,176	11,932	31,645	7,167	173,920

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1956:						
Mar.	7,800	5,911	782	1,758	7,851	15,651
Apr.	6,995	6,066	969	866	7,901	14,896
May	5,731	4,966	939	614	6,519	12,250
June	5,006	4,776	907	543	6,226	11,232
July	3,522	4,241	444	731	5,416	8,938
Aug.	4,715	4,902	882	684	6,468	11,183
Sept.	2,790	5,723	1,180	938	7,841	10,631
Oct.	5,238	6,122	908	1,183	8,213	13,931
Nov.	4,762	6,053	886	1,175	8,114	12,876
Dec.	6,661	7,101	967	1,012	9,080	15,741
1957:						
Jan.	6,460	7,270	905	960	9,135	15,595
Feb.	4,842	6,491	724	1,035	8,250	12,592
Mar.	5,856	7,268	924	1,127	9,319	15,175
Apr.	8,812	6,306	976	881	8,163	16,975

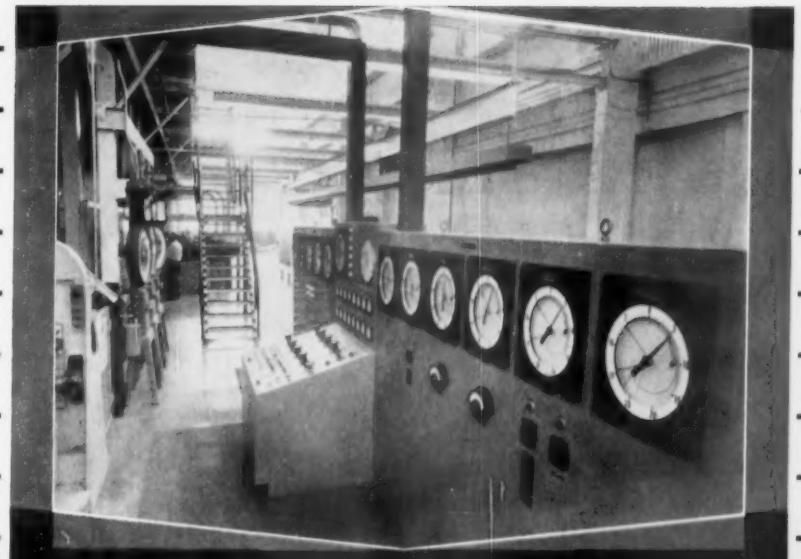
Consumption[1]

1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	..	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1956:						
Mar.	6,438	5,888	729	781	7,398	13,836
Apr.	5,693	4,923	741	692	6,356	12,049
May	5,239	4,745	728	691	6,214	11,453
June	5,171	4,350	637	657	5,644	10,815
July	4,855	3,731	562	466	4,759	9,614
Aug.	6,374	5,055	816	698	6,569	12,943
Sept.	6,233	4,937	692	699	6,328	12,561
Oct.	7,825	6,175	795	681	7,651	15,476
Nov.	6,431	5,406	723	659	6,788	13,219
Dec.	6,648	5,781	676	597	7,054	13,702
1957:						
Jan.	6,994	6,288	856	841	7,985	14,979
Feb.	6,398	5,894	758	708	7,360	13,758
Mar.	7,081	6,370	784	799	7,953	15,034
Apr.	6,455	5,522	734	603	6,859	13,314

Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1956:						
Mar.	18,309	6,867	1,097	2,340	10,304	28,613
Apr.	21,384	7,415	1,163	2,272	10,850	32,234
May	21,234	7,516	1,218	2,194	10,928	32,162
June	21,033	7,447	1,328	2,086	10,861	31,894
July	19,952	7,288	1,109	2,009	10,406	30,358
Aug.	18,099	6,402	1,076	1,703	9,181	27,280
Sept.	15,403	6,625	1,328	1,523	9,476	24,879
Oct.	12,322	5,703	1,263	1,680	8,646	20,968
Nov.	11,148	6,282	1,233	1,939	9,454	20,602
Dec.	12,064	7,451	1,384	1,558	10,393	22,457
1957:						
Jan.	11,831	7,191	1,329	1,936	10,456	22,287
Feb.	9,940	7,415	1,169	2,051	10,635	20,575
Mar.	10,173	7,689	1,170	2,157	11,016	21,189
Apr.	12,032	8,303	1,095	1,394	10,792	22,824

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.



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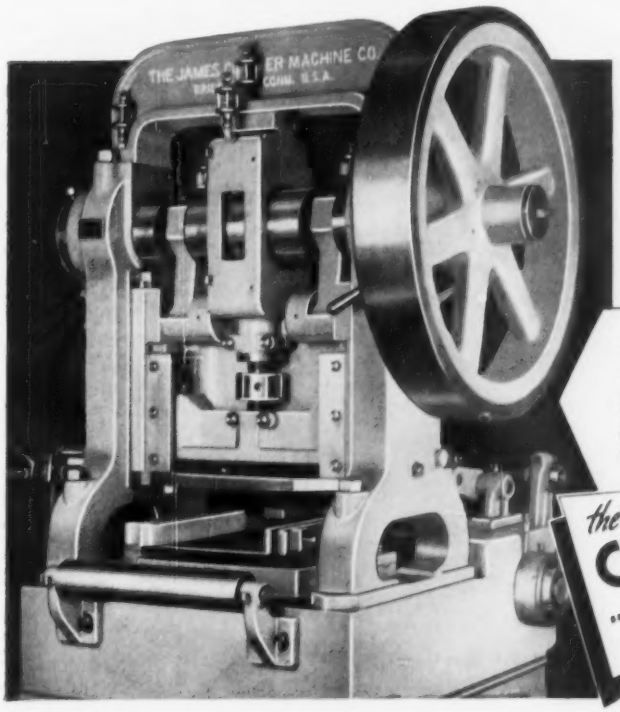

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1956 Production Workers (thousands)	1956 Average Weekly Earnings	1956 Average Weekly Hours	1956 Average Hourly Earnings	1957 Production Workers (thousands)	1957 Average Weekly Earnings	1957 Average Weekly Hours	1957 Average Hourly Earnings
Jan.	229.5	$87.91	40.7	$2.16	221.9	$91.84	41.0	$2.24
Feb.	224.5	85.81	40.1	2.14	218.5	90.98	40.8	2.23
Mar.	220.8	84.93	39.5	2.15	216.3	....	....	....
Apr.	218.7	85.79	39.9	2.15	....	....	....	....
May	216.0	86.18	39.9	2.16	....	....	....	....
June	208.5	84.93	39.5	2.15	....	....	....	....
July	208.9	86.15	39.7	2.17	....	....	....	....
Aug.	210.8	87.64	40.2	2.18	....	....	....	....
Sept.	215.4	89.51	40.5	2.21	....	....	....	....
Oct.	220.0	90.17	40.8	2.21	....	....	....	....
Nov.	198.9	88.29	40.5	2.18	....	....	....	....
Dec.	221.5	93.15	41.1	2.25	....	....	....	....

Tires and Tubes

Jan.	93.7	101.00	40.4	2.50	93.5	107.64	41.4	2.60
Feb.	93.2	97.71	39.4	2.48	92.8	106.04	41.1	2.58
Mar.	92.6	97.25	38.9	2.50	....	....	....	....
Apr.	91.8	98.00	39.2	2.50	....	....	....	....
May	91.6	99.65	39.7	2.51	....	....	....	....
June	90.1	98.25	39.3	2.50	....	....	....	....
July	90.0	98.14	39.1	2.51	....	....	....	....
Aug.	89.8	101.20	40.0	2.53	....	....	....	....
Sept.	91.6	102.51	40.2	2.55	....	....	....	....
Oct.	91.7	102.66	40.1	2.56	....	....	....	....
Nov.	74.8	103.53	40.6	2.55	....	....	....	....
Dec.	93.2	109.25	41.7	2.62	....	....	....	....

Rubber Footwear

Jan.	21.0	74.37	40.2	1.85	18.1	71.76	39.0	1.84
Feb.	20.9	74.74	40.4	1.85	17.6	72.10	39.4	1.83
Mar.	20.7	71.34	39.2	1.82	....	....	....	....
Apr.	20.3	72.25	39.7	1.82	....	....	....	....
May	20.0	72.25	39.7	1.82	....	....	....	....
June	19.4	70.53	39.4	1.79	....	....	....	....
July	18.9	71.28	39.6	1.80	....	....	....	....
Aug.	19.2	70.35	39.3	1.79	....	....	....	....
Sept.	19.3	71.71	39.4	1.82	....	....	....	....
Oct.	91.1	71.71	39.4	1.82	....	....	....	....
Nov.	18.7	71.55	39.1	1.83	....	....	....	....
Dec.	18.4	73.26	39.6	1.85	....	....	....	....

All Other Rubber Products

Jan.	114.8	79.73	41.1	1.94	110.3	81.39	40.9	1.99
Feb.	110.4	77.95	40.6	1.92	108.1	80.78	40.8	1.98
Mar.	107.5	76.99	40.1	1.92	....	....	....	....
Apr.	106.6	77.95	40.6	1.92	....	....	....	....
May	104.4	76.99	40.1	1.92	....	....	....	....
June	99.0	76.02	39.8	1.91	....	....	....	....
July	99.1	77.78	40.3	1.93	....	....	....	....
Aug.	101.8	78.76	40.6	1.94	....	....	....	....
Sept.	104.5	81.18	41.0	1.98	....	....	....	....
Oct.	109.2	82.98	41.7	1.99	....	....	....	....
Nov.	105.4	79.98	40.6	1.97	....	....	....	....
Dec.	109.9	82.59	41.3	1.99	....	....	....	....

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1950	1951	1952	1953	1954	1955	1956	1957
Jan.	31.89	45.04	42.96	33.24	34.15	35.07	35.24	34.82
Feb.	32.79	(a)	41.64	33.76	35.00	35.04	36.26	34.82
Mar.	32.65	46.06	41.70	34.10	35.23	34.33	36.70	35.35
Apr.	33.23	46.06	41.79	33.85	35.22	34.23	36.81	35.43
May	33.64	46.06	39.98	34.30	35.34	34.80	36.65	35.40
June	34.61	46.06	41.31	34.11	35.17	34.83	36.67	35.45
July	38.11	46.21	40.37	34.20	35.37	34.61	35.43	..
Aug.	38.93	35.93	40.42	33.82	35.19	34.53	34.31	....
Sept.	41.62	36.20	39.75	33.69	35.46	33.85	34.35	....
Oct.	40.66	38.13	37.52	33.53	35.24	33.93	34.45	....
Nov.	43.11	42.70	35.59	33.60	34.80	34.87	34.56	....
Dec.	43.37	43.32	33.76	33.52	35.03	34.95	34.56	..
Average for Year	37.05	42.43	39.71	33.81	35.10	34.59	35.50	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1955	1956	1957		1955	1956	1957
Jan.	145	147	145	July	137	125	....
Feb.	144	140	145	Aug.	138	135	....
Mar.	146	135	144	Sept.	142	132	....
Apr.	147	136	130	Oct.	147	134	....
May	146	127	....	Nov.	147	126	....
June	149	120	....	Dec.	144	137	....

Sales by the Rubber Industry

(in Millions of Dollars*)

	1955	1956	1957		1955	1956	1957
Jan.	424	415	474	July	471	459	....
Feb.	440	445	476	Aug.	456	436	....
Mar.	466	451	476	Sept.	456	429	....
Apr.	445	445	....	Oct.	447	454	....
May	465	464	....	Nov.	482	463	....
June	463	450	....	Dec.	465	461	....

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1955	1956	1957		1955	1956	1957
Jan.	790	935	995	July	853	987	....
Feb.	782	970	985	Aug.	863	1,007	....
Mar.	805	979	989	Sept.	874	1,007	....
Apr.	784	970	....	Oct.	902	1,022	....
May	810	985	....	Nov.	935	1,024	....
June	850	975	....	Dec.	934	998	....

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1915	79	58½	65.85	1936	23	13½	16.41
1916	102	55	72.50	1937	26⅜	14	19.39
1917	90	52	72.23	1938	17⅞	10¼	14.64
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¾	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¾	11½	16.36	1942	22½	22½	22.50
1922	28⅜	13⅜	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅜	17⅜	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¾	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21
1933	9⅞	2⅛	5.96	1954	34½	19½	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1950	1951	1952	1953	1954	1955	1956	1957
Jan.	18.33	71.21	....	29.40	20.22	33.92	41.70	33.32
Feb.	19.40	73.61	....	27.57	19.98	34.90	33.68	30.43
Mar.	19.86	72.05	....	26.59	20.16	31.08	33.68	31.76
Apr.	23.51	....	....	24.66	22.06	31.75	31.74	32.23
May	28.07	....	....	25.52	21.96	31.35	29.61	32.12
June	30.92	....	....	24.42	23.01	34.74	30.54	32.80
July	39.10	....	30.52	23.64	24.12	40.84	33.91	....
Aug.	51.63	....	29.36	23.36	23.26	45.85	35.69	....
Sept.	55.98	....	27.42	23.06	23.99	48.27	32.64	....
Oct.	62.19	....	27.26	20.82	26.57	43.81	32.68	..
Nov.	73.05	....	29.25	20.58	28.07	44.95	35.18	....
Dec.	71.20	....	31.26	20.92	29.88	48.40	37.01	..
Average for Year	41.10	(*)	29.15	24.21	23.61	39.16	34.24	....

Note: (*) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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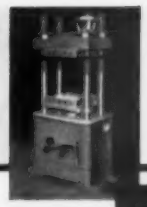

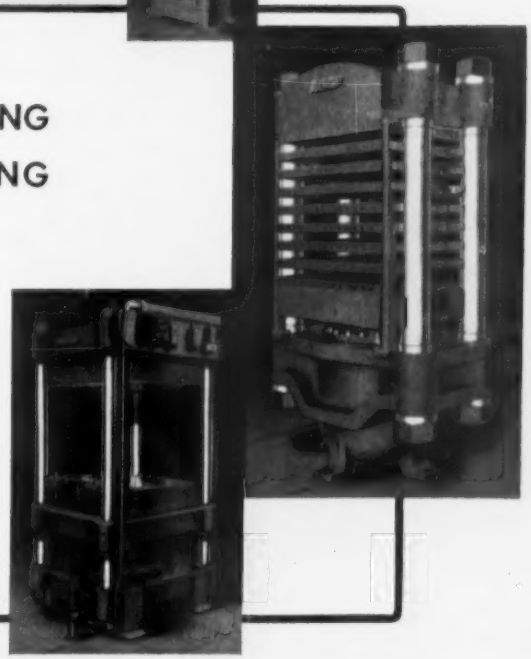

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THE STAMFORD RUBBER SUPPLY COMPANY, STAMFORD, CONN.

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car	30,874	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1956:						
Mar. (total)	3,466	5,034	127	8,627	9,193	21,562
Passenger Car	3,027	4,372	65	7,464	7,812	18,096
Truck and Bus	439	662	62	1,163	1,382	3,465
Apr. (total)	3,217	5,761	141	9,119	8,834	21,132
Passenger Car	2,787	4,994	67	7,847	7,530	17,649
Truck and Bus	430	767	74	1,271	1,303	3,483
May (total)	2,770	5,980	130	8,880	8,986	21,296
Passenger Car	2,349	5,203	65	7,617	7,628	17,714
Truck and Bus	421	777	65	1,264	1,358	3,582
June (total)	2,533	6,627	129	9,289	7,929	19,947
Passenger Car	2,162	5,659	64	7,885	6,600	16,443
Truck and Bus	372	968	65	1,404	1,329	3,503
July (total)	2,833	6,319	145	9,298	6,741	17,394
Passenger Car	2,471	5,482	73	8,026	5,668	14,088
Truck and Bus	362	837	72	1,271	1,073	3,306
Aug. (total)	2,302	6,178	163	8,644	8,050	16,794
Passenger Car	1,953	5,359	77	7,389	6,897	13,578
Truck and Bus	349	819	86	1,254	1,153	3,217
Sept. (total)	1,553	5,238	162	6,952	7,800	17,648
Passenger Car	1,261	4,427	70	5,758	6,647	14,468
Truck and Bus	291	811	92	1,194	1,153	3,180
Oct. (total)	2,908	4,703	165	7,776	8,799	18,775
Passenger Car	2,530	3,854	87	6,471	7,526	15,607
Truck and Bus	378	849	78	1,305	1,273	3,168
Nov. (total)	3,516	3,881	121	7,518	7,641	18,803
Passenger Car	3,179	3,255	62	6,496	6,580	15,596
Truck and Bus	337	626	59	1,022	1,060	3,207
Dec. (total)	3,579	3,803	166	7,548	8,556	19,872
Passenger Car	3,277	3,220	90	6,587	7,425	16,494
Truck and Bus	301	583	76	961	1,130	3,378
1957:						
Jan. (total)	3,496	5,195	183	8,874	9,504	20,490
Passenger Car	3,192	4,519	99	7,810	8,296	16,978
Truck and Bus	305	677	83	1,065	1,208	3,512
Feb. (total)	3,361	5,051	127	8,539	9,169	21,008
Passenger Car	3,017	4,453	68	7,538	8,047	17,376
Truck and Bus	344	598	59	1,001	1,122	3,633
Mar. (total)	3,381	5,579	134	9,114	9,766	21,743
Passenger Car	3,051	4,875	80	8,007	8,630	18,068
Truck and Bus	330	704	54	1,107	1,136	3,675
Apr. (total)	3,246	5,989	146	9,381	8,950	21,308
Passenger Car	2,809	5,218	78	8,104	7,878	17,821
Truck and Bus	438	770	69	1,277	1,072	3,486

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1937	3,915,889	892,382	4,808,271	1947	3,558,178	1,220,634	4,778,812
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1956:							
Jan.	591,032	98,968	690,000	July	440,980	80,731	521,711
Feb.	560,924	102,384	663,308	Aug.	417,020	85,827	502,847
Mar.	583,169	106,379	689,548	Sept.	203,888	71,299	275,187
Apr.	552,881	101,081	653,962	Oct.	352,140	92,684	444,824
May	474,010	96,114	570,124	Nov.	576,708	90,246	666,954
June	445,758	91,791	537,549	Dec.	617,599	82,913	700,512
1957:							
Jan.	628,045	91,117	719,162	July	.....	.....	.....
Feb.	570,023	91,767	661,790	Aug.	.....	.....	.....
Mar.	585,734	91,703	676,437	Sept.	.....	.....	.....
Apr.	541,733	105,175	646,908	Oct.	.....	.....	.....
May	531,727	100,485	632,212	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	..
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1956:						
Aug.	242	2,954	99	3,295	2,795	5,962
Sept.	213	2,472	91	2,777	2,773	6,056
Oct.	261	2,518	98	2,877	3,025	6,469
Nov.	259	2,468	65	2,792	2,585	6,250
Dec.	235	2,515	87	2,837	2,670	6,109
1957:						
Jan.	234	3,494	101	3,829	3,364	5,789
Feb.	267	2,964	61	3,291	3,362	5,960
Mar.	240	3,058	100	3,397	3,822	6,540
Apr.	311	2,708	85	3,104	3,428	6,969

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

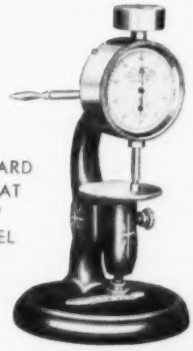
(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1956:										
Feb.	6,849	5,296	16,509	5,187	4,894	1,792	6,185	2,718	8,696	58,126
Mar.	7,388	5,280	16,965	4,962	5,016	2,274	5,811	3,162	9,364	60,222
Apr.	6,247	4,674	15,560	4,646	4,494	2,344	7,295	3,114	11,612	59,986
May	5,948	4,403	16,470	4,322	5,075	2,458	6,087	3,288	10,158	58,209
June	5,345	4,217	14,946	4,727	5,316	2,364	5,228	2,863	7,731	52,737
July	4,722	3,714	15,203	4,298	4,231	2,681	2,321	3,165	8,146	48,481
Aug.	6,497	4,787	17,490	5,727	6,798	2,416	7,228	3,256	9,213	63,412
Sept.	7,159	4,194	17,228	5,198	5,526	2,025	5,945	2,893	9,291	59,458
Oct.	8,581	5,341	21,339	6,384	6,790	2,568	5,984	3,231	10,773	70,992
Nov.	7,002	4,774	19,895	5,888	6,253	2,639	6,128	3,115	10,242	65,936
Dec.	5,829	3,990	18,279	5,416	5,810	2,672	7,063	2,429	9,297	60,785
1957:										
Jan.	8,094	5,761	18,505	6,197	5,958	3,077	3,438	2,988	10,408	64,426
Feb.	8,669	4,564	19,805	5,137	6,221	2,682	3,258	3,255	9,529	63,120
Mar.	8,589	5,272	20,292	5,440	6,879	2,798	4,173	3,372	10,060	67,375

Source: Chemical Division, U. S. Tariff Commission.

RANDALL & STICKNEY

THICKNESS GAUGES FOR RUBBER



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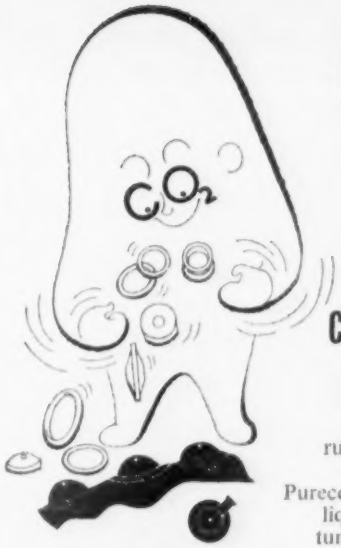

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Riegelsville, N. J.

Various Compounding Materials Consumed by the Rubber Industry

Material	1949	1950	1951	1952	1953	1954	1955
Antimony, Primary:							
Short tons	55	103[c]	19[c]	66[c]	20[c]	49[c]	45[c]
% of total	.005	.007	.001	.004	.001	.004	.004
Asphalt:[a]							
Short tons	18,050	26,819	21,414	33,288	.....	.....	.....
% of total	0.3	0.3	0.3	0.4	.....	.....	.....
Barite (Barytes):							
Short tons	14,000	19,000	15,000	18,000	21,000	20,000	.....
% of total	2.53	3.31	2.13	2.0	2.0	2.0	.....
Carbon Black:							
Short tons	383,565	515,184	530,614	537,273	566,797	511,813	643,430
% of total	93.3	92.9	93.9	93.1	94.4	...	93.7
Clay, Kaolin:							
Short tons	197,341	263,306	231,331	240,982	241,052	247,431	.....
% of total	13.1	15.0	12.7	13.2	12.8	13.2	.....
Clay, Fire & Stoneware:							
Short tons	27,148	9,500	....	9,322	18,475	8,781	.....
% of total	0.3	0.1	....	0.1	.2	.1	.....
Lime:							
Short tons	715	908	1,126	2,000	1,631	1,555	.....
% of total	.0002	.0002	[d]	[d]	[d]	[d]	.....
Litharge:							
Short tons	1,398	3,047	2,641	2,109	2,230	1,768	.....
% of total	1.2	1.7	1.7	1.5	1.4	1.3	.....
Lithopone:							
Short tons	3,245	4,092	3,295	1,523	1,723	1,701	2,163
% of total	4.1	3.9	3.2	2.5	3.3	3.9	5.0
Mica, Ground:							
Short tons	3,856	5,776	6,551	5,126	5,668	5,021	.....
% of total	7.0	8.0	9.0	7.0	7.8	6.3	.....
Sulfur:							
Short tons	59,360	75,000	75,000	75,000	80,000	.....	.....
% of total	1.3	1.3	1.4	1.4	1.4	.....	.....
Talc:[b]							
Short tons	53,400	75,900	70,970	64,476	32,137	30,621	.....
% of total	12.0	12.0	11.2	10.9	0.7	.07	.....
Zinc Oxide:							
Short tons	58,496	82,944	71,507	72,774	78,439	71,058	86,677
% of total	52.5	51.6	48.4	51.2	52.7	50.7	51.5

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude[a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1956:					
Mar.	28,468	26,176	20.3	1,163	33,326
Apr.	26,933	23,999	19.6	1,179	34,360
May	25,485	23,560	18.9	1,297	34,863
June	22,153	20,049	18.4	1,264	35,647
Jul.	19,776	18,099	18.7	952	35,703
Aug.	21,724	21,498	18.0	1,076	35,512
Sept.	22,368	20,242	17.9	1,015	36,527
Oct.	26,318	23,946	17.8	1,298	37,904
Nov.	20,009	20,832	18.2	1,189	36,063
Dec.	20,673	20,737	17.7	902	34,969
1957:					
Jan.	25,103	24,053	17.5	1,288	34,552
Feb.	21,896	22,773	18.4	1,263	32,010
Mar.	25,088	24,633	19.0	1,298	30,975

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Not Woven	Rayon Tire Cord Woven	Cotton and Nylon Cord & Fabric[a]	Chafer Fabrics (all fibers)	Total Tire Cord and Fabric	Stocks[b]: Cotton and Nylon Cord & Fabric	Rayon Cord and Fabric
1956:							
Jan.-Mar.	23,707	74,833	29,298	14,176	129,199	10,185	48,936
Apr.-June	21,557	60,644	28,752	11,628	112,546	10,433	43,737
July-Sept.	18,698	56,961	26,349	7,958	102,575	11,094	44,376
Oct.-Dec.	20,071	55,655	28,493	9,497	104,921	12,500	38,060
Total	84,033	248,093	112,892	43,259	449,241	44,212	175,109
1957:							
Jan.-Mar.	21,853	68,825	31,393	11,028	123,182	11,844	37,153
Apr.-June	.....	.....	.....	.....	.....	...	...
July-Sept.	.....	.....	.....	.....	.....	...	.....
Oct.-Dec.	.....	.....	.....	.....	.....	...	...
Total	.....	.....	.....	.....	.....	...	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1951	1952	1953	1954	1955	1956	1957
Jan.	80,670	86,863	89,634	89,852	96,397	100,642	109,295
Feb.	72,864	82,043	86,458	86,206	88,464	98,088	96,694
Mar.	86,962	87,065	98,158	101,549	105,684	112,412	113,166
Apr.	87,573	98,563	102,044	103,866	111,116	113,034	.....
May	100,266	101,137	105,918	104,418	115,707	123,560	.....
June	96,364	99,305	114,703	113,037	120,710	126,838	.....
July	100,567	105,397	112,969	112,231	115,653	120,708	.....
Aug.	101,453	102,954	109,124	110,223	121,816	125,847	.....
Sept.	91,891	100,095	106,158	104,706	113,379	111,574	.....
Oct.	100,209	103,689	106,037	105,607	112,558	119,204	.....
Nov.	88,581	91,326	99,210	102,393	109,212	112,113	.....
Dec.	84,551	95,817	100,225	104,258	111,034	108,096	.....
Total	1,091,951	1,154,254	1,230,629	1,238,346	1,321,730	1,372,116	.....

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1956:						
May	31	22,595	152	159,121	33	34,803
June	99	78,150	248	243,307	15	14,008
July	46	53,177	147	152,950	13	31,774
Aug.	76	89,476	212	225,769	18	21,499
Sept.	195	165,793	103	127,682	5	10,199
Oct.	232	181,337	158	155,523	23	19,254
Nov.	232	194,511	116	144,945	74	45,853
Dec.	111	58,952	217	234,224	38	30,131
1957:						
Jan.	38	17,911	141	155,467	15	10,684
Feb.	12	12,191	117	130,001	22	27,792
Mar.	89	51,830	150	178,499	16	7,894

Source: U. S. Department of Commerce.

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26" x 84" Farrel-Birmingham, Never Used

PRESSES, HYDRAULIC

5 Ton, Logan, Twin Ram, 7½ HP MD
15 Ton, Consolidated, Self-Cont.
15 Ton, Dennison, 12 Station Indexing Table 10 HP MD Pump
20 Ton, Elmes, No. 3429P Laboratory, Electrically Heated Platens 8" x 8"
25 Ton, Consolidated, 24" x 30", Self-Contained Pump & Motor
30 Ton, Watson-Stillman, Laboratory, Platens 8" x 8" (2)
30 Ton, Watson-Stillman, 4½" Ram x 18" Stroke, 12½ LR-16", F-B 22" DLO MD
35 Ton, HPM, Down-Acting, Ram 6" x 6" Str., Bed 12" x 6", DLO 15", Self-Cont.
50 Ton, Baldwin-Southwark, Angle Molding Press, Practically New
60 Ton, 2 Rod Construction 9" Upmoving Ram x 24" Str. 35 L-R 30" F-B
75 Ton, Farquhar, Up-Acting 30" x 42" Platens
75 Ton, Watson-Stillman, Fully Automatic, 20" & 20" Platen, 5 HP MD
100 Ton, Stokes Standard, Semi-Automatic, Power System, Timing Controls
100 Ton, Watson-Stillman, Platens 13" x 13", Ram 3½" x 3" Str., MD
100 Ton, Watson-Stillman, 4-Post, Platens 11¾" x 12", Ram 8" x 15" Str
100 Ton, Watson-Stillman, Bed 22" x 20", DLO 24", Self-Cont.
150 Ton, Stokes Standard, Semi-Automatic, Power System Timing Controls
150 Ton, HPM, 22" x 18" Platen, 12" Ram x 24" Str., 60" DLO
150 Ton, Carey, Platens 20" x 16" Adj., DLO 8"-28"
175 Ton, Viceroy, Slab-Side, 24" x 24" Elec. Htd. Platen with Hand Pump
200 Ton, Stokes, Semi-Automatic, Power System, Timing Controls
200 Ton, HPM, 22" x 18" Platen, 16" Ram x 36" Str., 60" DLO
200 Ton, Elmes, 14" Ram x 42" Str., 24" x 30" Bed
200 Ton, Hymac, 16" Down Moving Ram, 30" x 30" Bed
225 Ton, Farrel, 14" Ram x 18" Stroke L-R 26½" x F-B 24½", 7½ HP
300 Ton, Stokes, Semi-Automatic, Power System, Timing Controls
314 Tons, Lake Erie, 36" x 36" Semi-Automatic, Push Button Controls, 10 HP Pump & Motor
400 Ton, Robertson, Hobbing Press, 13" Ram x 4" Str., 16" DLO
450 Ton, HPM, 24" x 24" Platen, 18" Ram x 60" Str., 156" DLO
625 Ton, Farrel, Steam Platens 52" x 52", Pump, Motor, Controls
650 Ton, HPM, 24" x 24" Platen, 20" Ram x 60" Str., 120" DLO
700 Ton, Erie Presses, Multi-opening, 42" x 42" Steam Platens
2400 Ton, Birmingham, Belt Press, 65" x 26'6", 24—11" Rams

TABLET MACHINES

Model 280-C, Stokes, 80 Ton Single Punch
Model R Stokes, Single Punch, Variable Speed Motor Drive, 3 HP
Model 45, Defiance, 200 Ton, 15 HP, Vari-Speed, MD
No. 5, Arthur Colton, Motor Drive, 3 HP
No. DDS-2, Stokes, 23 Stations, US Vari-Drive, 10 HP
Model T, Stokes, Hydraulic Equalizer MD

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MIXERS

Banbury, Model "B", Chrome Plated — New & Unused
J. H. Day, Model 17E822, 4000# Capacity Mixer
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1000#, J. H. Day, Size D-10, Jacketed Ribbon Blender

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9" x 48", American Tool, 4 Roll Belt Drive
6" x 13", Elec. Htd., 6 Roll Lab Calender, with 7½ HP MD
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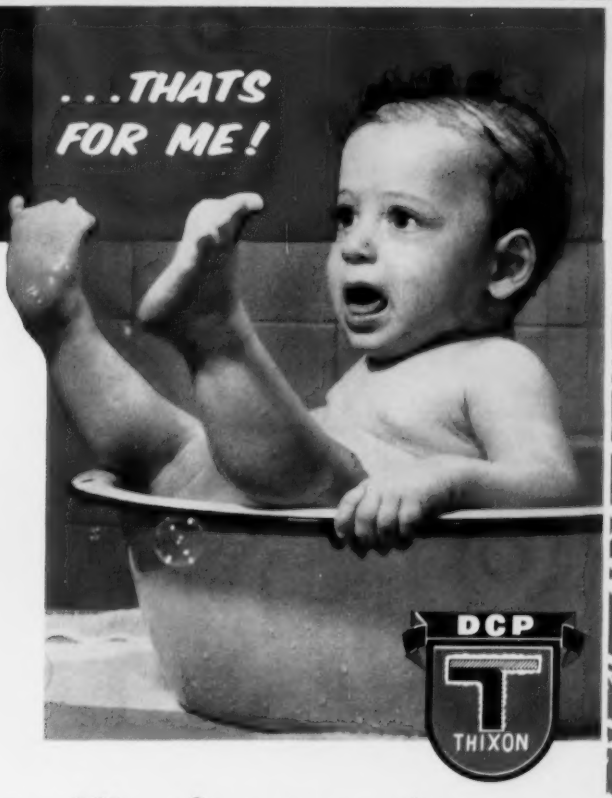

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AUGUST, 1957

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